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JULY 1974

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WEEDS TREES and TURF®

July 1974, Vol. 13, No. 7

THE COVER—The "Spider," an 11-foot wide backfiller-compactor designed by Ken Cloud of Formost Construction Company, does the work of four men in an irrigation installation job. Three tamps pack soil in the trench immediately behind backfilling augers.

MISSISSIPPI METHODS—The Mississippi State Highway Department has a running battle with broadleaf weeds and johnsongrass. A selective chemical weed control program is designed to kill weeds and leave desirable vegetation to do its job... **11**

URBAN SPACE PLANNING: Room for Recreation—Booming urban populations create growing demands for recreation areas in and around big cities. Gerald L. Smith, of Utah State University, deals with the need for urban open space planning..... **18**

FERTIGATION: Double Duty For Your Irrigation System — Two Floridians, Larry Weber and Max Brown, explore the potential in applying fertilizer through an irrigation system. Weber, superintendent of Inverrary Country Club, describes his fertigation system. Brown, a turfgrass agronomist, discusses injection methods and the advantages and disadvantages of fertigation..... **22, 23**

A FAMILY AFFAIR for 'Formost'—WTT cover story. The Cloud family has been installing irrigation systems for 28 years, specializing in golf course irrigation. Ken Cloud's story explains how his Formost Construction Company became one of the top installers of golf course sprinkler irrigation systems..... **30**

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editorial

The good old days . . . if we're really honest with ourselves, couldn't match many of our modern advantages and improved standards of living. But the old days had many a custom we're beginning to miss very much indeed.

We remember fondly, for example, that competitive spirit in business which fostered a feeling of courtesy and service toward the customer. If you will, there was a courtship of the public. The drugstore delivered. Shopkeepers guaranteed satisfaction — and smiled about it as well.

It may not be gone forever — but the service attitude in business is certainly on an extended vacation. It's missing in many parts of the green industry as well.

We're disappointed and often downright irritated to find how carelessly the public is sometimes served in our industries. The trimmed branch that falls to wipe out rose bushes . . . the calls to answering services which are not returned . . . the spray drift . . . the missed appointments.

Most critically, we are disappointed to hear more often than ever: "we don't do that anymore," or . . . "I'm sorry but we don't offer that service." Everywhere we go these days: "I'm sorry, I'm sorry."

In our view there is just no place in a service-oriented industry for the phrase: "we can't do that." To us it means — "we don't provide service, we just sell a tangible product . . . take it or leave it."

To those parts of the green industry which are not related to a service industry . . . there's still a good bit of helpful philosophy contained in the service technique.

Briefly, the service approach is solving problems. Not the obvious, tangible problems, but the very real concerns which people have on their mind. A man with disease problems in his turfgrass may really be thinking: "I wish someone would come along and take care of this entire turf project of mine."

A lady who is asking for price estimates on a tree care job may really be looking for "men I can be sure won't drive their truck across the backyard."

To solve problems, we need to begin by understanding what they really are and approach them firmly and courteously.

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Power equipment for public works

Government News / Business

EPA withdrew formal hearings on the cancellation of certain uses of 2,4,5-T. They found that data does not yet exist to assess the potential hazards associated with the use of the herbicide. Formal hearings were scheduled to begin in August. Lack of data on health effects of 2,4,5-T applies both to the compound itself and to a common contaminant tetrachloro-dibenzo-para-dioxin (TCDD). Last year, hearings were postponed until August, 1974, so that samples of human milk and fat, beef, rice and wildlife could be analyzed for TCDD residues.

Irrigation Industries, Inc., Concord, Calif., was purchased assets, goodwill and name by the Automatic Rain Co., Menlo Park, Calif. Hopefully, the new acquisition will strengthen Automatic Rain's service throughout northern California.

Washington State Department of Agriculture has been awarded a one-year $50,000 pesticides demonstration grant. The EPA grant is designed for: development of a model strategy for protecting the health of farmworkers, applicators and others occupationally exposed to fields treated with pesticides; and to enable state personnel to inspect pesticide producing plants and take samples that will support Federal enforcement actions related to violations of the Federal pesticides law. Another $50,000 pesticide demonstration grant was awarded to Hawaii January, 1974.

U. S. Army Corps of Engineers was granted "emergency exemption" under the 1972 Federal pesticides law to use 12,000 pounds of 2,4-D to control water hyacinth on 3,000 acres of the St. Johns River near Jacksonville, Fla.

EPA has told the states that no funds are available to subsidize state pesticide applicator certification programs. Many states replied that they are in no position to educate, test, certify, administer or enforce the FIFRA-required certification. The states suggest the money come from congress.

Respirator certification hearings were postponed until September 30. NIOSH (National Institute for Occupational Safety and Health) is doing the certification work for OSHA. Rumor has it that NIOSH expects further delays.

OSHA's Compliance Operations Manual has been replaced by an updated version reflecting changes in compliance policy. The loose-leaf booklet contains four new chapters and will be available as Volume V of OSHA's subscription service. Subscribers can receive the basic manual and any subsequent changes for $8.00, prepaid. It may be ordered from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. It is expected to be available in December.

Former Agriculture Secretary Orville L. Freeman has warned that "the availability of arable land is nearing its limit. In many parts of the world there is actually less agricultural land available every year because of erosion, industrial development, residential and transportation requirements, and other factors," he said.

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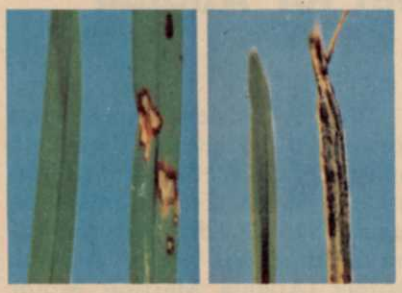

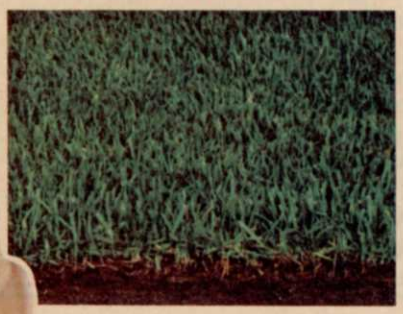

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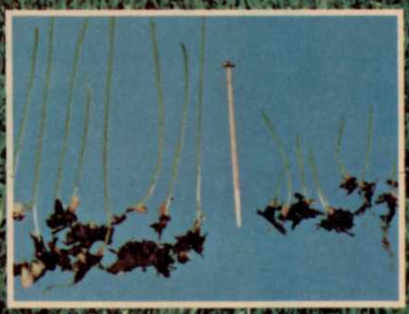

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50 Years and on the Grow

ISTC Convention Set for August

"Fifty Golden Years and Growing" is the theme of the fiftieth anniversary convention of the International Shade Tree Conference, August 18 to 22. This year's convention headquarters are at Atlanta, Georgia (Atlanta Marriott Motor Hotel).

Some 900 delegates attended last year's convention which was held in Boston. A record-breaking crowd is expected to be on hand for the golden anniversary convention.

Registration is $65 for the educational program (including social events), $45 for the ladies' program, and $28 for the youth program. Lodging at the hotel costs $28 for a single room and $36 for a double or a twin.

A hall in the hotel will be devoted to exhibits and displays, and there will be field demonstrations at the all-delegate event on Tuesday, August 20.

Sunday, August 18:

Morning:
- Registration
- Chapter presidents and past presidents meetings

Afternoon:
- Executive committee meeting

Monday, August 19:

Morning:
- Registration
- Official opening, address by President F. Lewis Dinsmore

Afternoon:
- "Half-century with trees and their friends," Dr. Paul E. Tilford
- "Control of water loss in shade trees," Dr. Theodore Kozlowski and Dr. W. J. Davies
- "A review of the major tree diseases of the century," Dr. J. C. Carter
- "Fifty-two years of tree work," A. E. Price

Evening:
- Hospitality party

Tuesday, August 20:

Morning:
- "Virus and mycoplasma diseases of shade and ornamental trees," Dr. D. N. Agrios
- "New directions and developments in shade tree entomology," Dr. William Wallner
- "Trees in the landscape — a look beyond the obvious," Prof. William R. Nelson, Jr.

Afternoon:
- All-delegate event: Stone Mountain Park, equipment demonstrations, southern barbeque and entertainment.

Wednesday, August 21:

Morning:
- Business session — Board of Governors Meeting and Committee Reports (open to all delegates)

Afternoon:
- "New tree selections," William Collins
- "Arboricultural communication," Dr. John W. Andresen and Eric Jorgenson
- "Cabling and bracing," Leslie S. Mayne

(continued on page 16)

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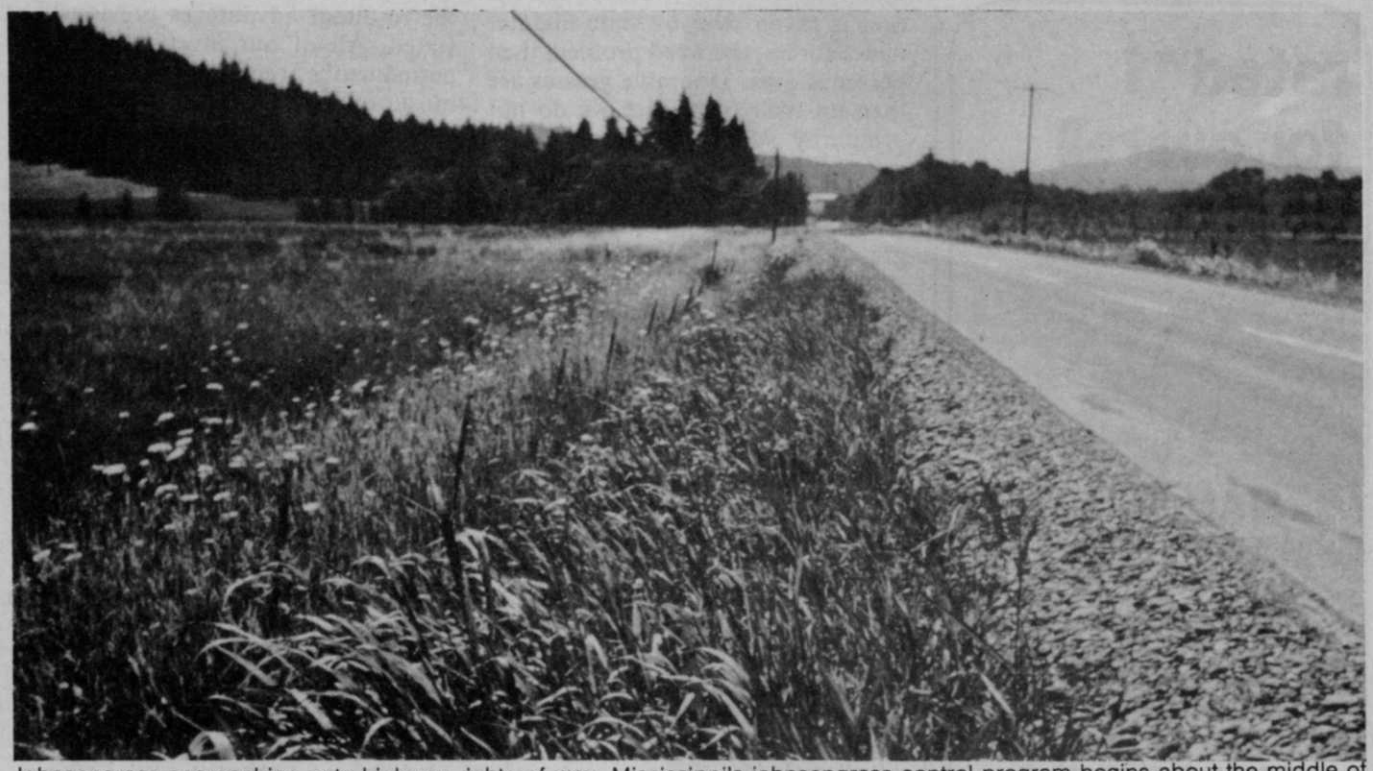

Johnsongrass encroaching onto highway rights-of-way. Mississippi's johnsongrass control program begins about the middle of May in the southern portions of the state and nearly two weeks later in northern areas.

The Mississippi Method

A Weed Control Program

By JOHN L. SNUGGS*

We have encountered numerous obstacles in establishing a definite chemical weed control program for the Mississippi State Highway Department but, luckily, we have always been able to obtain the assistance of competent technical representatives from leading chemical companies in our area.

From the standpoint of selective weed control, the department began an experimental program of chemically treating undesirable roadside vegetation in 1964 under the direction of Lamar Hussey, former agronomist for the department. Not only did Hussey's initial chemical program prove to be successful and convincing; it also served as a guide for the other highway districts in developing their chemical weed control programs.

The year 1968 was probably the most significant year in chemical weed control since that was when a continuous program of both broadleaf and johnsongrass control was first initiated by John McLeod, former agronomist for the Newton District. It was McLeod's tireless efforts which proved beyond any doubt that chemical weed control was here to stay and that it definitely deserved a place in the department's maintenance program. Our selective weed control program has now been expanded into all six districts with most emphasis being placed on broadleaf weed and johnsongrass *(Sorghum halepense)* control.

Problems

Probably, our most extensive weed problems encountered are found in the Mississippi delta especially since most of the soils there are very fertile. Almost every type weed adapted to the Southern U.S. will be found growing somewhere in the delta. Two of the most common and troublesome weeds found growing along roadsides in the delta area are dock *(Rumex spp.)* and johnsongrass; however, these two weeds are not limited to just this area and both are very prolific throughout the entire state of Mississippi. Another weed quite common in the delta and adjoining areas is coffeeweed *(Sesbania sp.)*. Two unsightly broadleaf weeds commonly occurring along roadsides over the entire state are sowthistle *(Sonchus sp.)* and Canada thistle *(Cirsium sp.)*. These two weeds produce small seed that are scattered many miles by wind and water.

In Roadside Development, our main concern actually centers around performing erosion control over the highway right-of-way by providing both a temporary and permanent vegetative cover usually in the form of selected grasses, shrubs, or trees. Our main grasses used for establishing permanent vegetative cover on new construction projects are bermudagrass *(Cynodon dactylon)*, bahiagrass *(Paspalum notatum)*, tall fescue *(Festuca arundinacea)*, and weeping lovegrass *(Eragrostis curvula)*. Crimson clover *(Trifolium repens)* is used to a lesser degree, primarily for temporary erosion control during the winter months.

Once an area of new construc-

*The author is Mississippi's Manager of Roadside Development headquartered at Jackson.

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tion is taken over by state maintenance forces, the weed problem then becomes ours. Desirable grasses are then on their own since we do not ordinarily supply additional fertilizer on vegetation after the contractor is released from his responsibility of maintaining an area. These grasses are often planted on steep slopes that have no topsoil whatsoever; and, consequently, the only plant nutrients contained in these soils are those supplied by the contractor at planting which usually last from six months to one year. Along come numerous weeds and compete with the desirable grasses for sunlight, moisture, air and nutrients. A potential erosion problem is then staring us in the face. We must then decide on performing some type of selective weed control in order to eliminate the undesirable vegetation but leaving the desirable vegetation to perform its job. We try to develop a general plan of action which includes:

a. Identification of specific weed problems
b. Selection of the proper herbicidal treatment
c. Utilization of proper equipment and trained personnel
d. Strict observance of all safety precautions
e. Follow up on all work

Equipment

It would be virtually impossible to give a comprehensive review of all the different types of equipment we use for applying herbicides. Some of the units are homemade and were transformed into spray rigs from war surplus material; thus, you might expect that we have experienced numerous mechanical problems from time to time using these rigs. Our most expensive equipment at the present is the ultramodern invert units that we use in both the broadleaf and johnsongrass control programs. We now have four of these units located in three of the six districts that comprise the state of Mississippi. These units enable the operator to reduce the drift problem, thus, covering a uniform spray pattern approximately fifteen feet more than is accomplished by the conventional type units. The invert unit forms a water in oil emulsion whereas the conventional unit forms an oil in water emulsion. The result is a spray particle formed with greater density and viscosity with the resultant advantages previously stated. All of our invert units are permanently truck-mounted as are most of the conventional units; however, we do have some tractor rigs that are used in areas inaccessible to trucks. Our conventional units use a boomless nozzle cluster for delivery of the spray material. Due to all the numerous and various types of obstacles confronted along most highways, it would not be practical to use a boom. Most of the tanks on the conventional units have a capacity of 1,000 gallons.

Our spray crews must thoroughly familiarize themselves with the specific type equipment being used in order to obtain maximum performance and, thus, achieve good results. Only when the equipment operates properly can we expect to obtain satisfactory results.

Broadleaf Control Program

The primary target of our broadleaf weed control program is dock and thistles. Wild garlic *(Allium vineale)*, kudzu *(Pueraria lobata)* and japanese honeysuckle *(Lonicera japonica)* are problems in some areas of the state but are not considered to be as serious as the dock and thistles. This type treatment ordinarily is accomplished by using the hormone-type chemicals — 2,4-D and 2,4,5-T. The rates of application for control vary from one to two pounds active material per acre. We have used primarily the amine formulation of 2,4-D for conventional application with varying results; however, we have also had success using the ester formulation especially during the month of February when temperatures are still rather cool. We do not use the ester formulation after row crops and gardens are planted due, of course, to its high volatility. This past year, we made extensive use of an invert formulation of 2,4-D in our invert spray equipment which helped reduce drift and offset some adverse climatic conditions.

We have found that the success of the broadleaf weed control program is much more dependent upon climatic conditions than the other chemical programs. Fluctuating temperatures, high wind, and excessive rainfall all have severely hampered our broadleaf program on several occasions in the past.

Johnsongrass Control Program

Most of our emphasis on chemical weed control in the past has been

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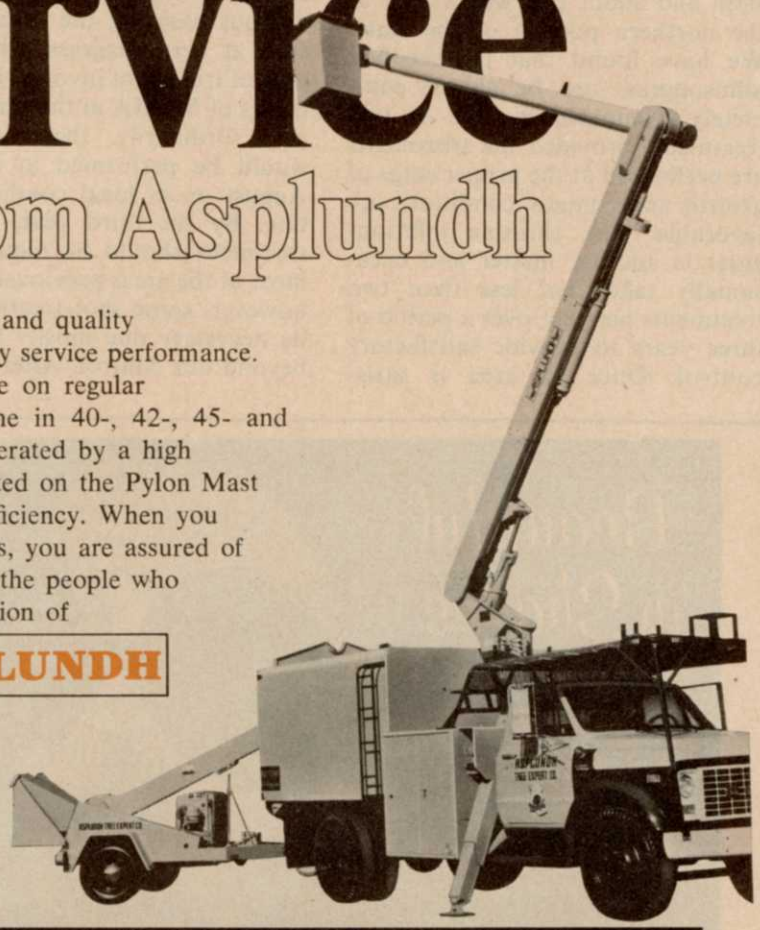

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on controlling johnsongrass; and, consequently, this is the area in which we have had our most success. Most of our experience in treating johnsongrass has been with the organic arsenicals, primarily MSMA. We have experimented considerably using MSMA by varying the rates as well as the formulations. Experience has revealed that in order to be successful in a program of this nature, we must perform these treatments according to location, season, and climatic conditions.

Ordinarily, our johnsongrass control program is initiated about the middle of May in south Mississippi and about two weeks later in the northern portion of the state. We have found that the seedling johnsongrass can be almost completely eliminated by one or two treatments provided the treatments are performed at the proper stage of growth and climatic conditions are favorable. The rhizome johnsongrass is another matter and occasionally takes not less than two treatments per year over a period of three years to provide satisfactory control. Once an area is satisfactorily rid of johnsongrass, it must be observed for possible reinfestation from adjacent landowner's property and spot treatments must then be performed to keep down the johnsongrass.

Upon initiating a johnsongrass control program in an area previously untreated, we try to follow a general recommendation we have developed during the past five years. Assuming the areas involved to be heavily infested, we plan on performing three MSMA treatments the first year at intervals of approximately six weeks. We normally use a rate of three pounds MSMA per acre which is usually sufficient to kill the foliage of the johnsongrass without harming the desired grass such as bermudagrass. The second year of treatment involves two treatments of MSMA at the three pound rate. Ordinarily, these treatments would be performed in June and August or as local conditions dictate. By the third year, only one treatment should be required over most of the areas previously treated; however, some spot treatments will be necessary due mostly to factors beyond our control. After the third year, some spot treatments will still be necessary; but for the most part, we feel that the worst part of the problem will have been solved. Our main problem in carrying out this continuous johnsongrass control program has been getting over all the intended areas each year with the desired number of treatments. This has been due in part to a lack of proper equipment and trained personnel.

One noticeable side effect in using MSMA to treat johnsongrass has been a partial elimination of bahiagrass in favor of bermudagrass, which ordinarily is not damaged by MSMA. Since the bahiagrass is well-adapted to south Mississippi and johnsongrass is less apparent in this area, we do not anticipate any great problem over the loss of some of our bahiagrass. We are fortunate that bermudagrass is well-adapted over the entire state.

We definitely believe that our selective chemical weed control program has proven to be worthwhile even though we have met with some failures, especially in the early phases of the program. The need for any mowing has been eliminated on some sections of secondary routes in the two central districts of the state; however, it should be stated here that our ultimate goal is not the complete elimination of mechanical mowing, for even where we have completely pure stands of bahiagrass and bermudagrass, there will still be a need for some mowing in order to provide a neater and more uniform appearance, especially in and around urban areas. We believe that by using a combination of mechanical and chemical control methods, a much more attractive roadside will be the result.

The Mississippi State Highway Department has a graduate agronomist or horticulturist who is located in each district, and it is his responsibility to carry out the chemical weed control program plus a number of other duties. One problem that we have encountered is that some of our men have become so well-trained in using chemicals that they are hired by large chemical companies; therefore, a new man has to be hired, and as a result, a successful chemical program may be temporarily interrupted since it usually takes a man at least two years to become thoroughly familiar with the various phases of chemical weed control.

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Chipco Buctril® – for postemergent control of a broad spectrum of broadleaf weeds in newly planted turf grasses.

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Chipco Turf Herbicide "D" – for postemergent control of broadleaf weeds such as dandelion, curled dock and many others in established turf.

Chipco Turf Herbicide MCPP – for especially effective postemergent control of surface-creeping broadleaf weeds such as clovers, chickweeds, ground ivy, knotweed, and others in established turf.

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The new chippers feature a design that combines a *rotating anvil** with a heavy-duty chipping rotor that also serves as a blower and flywheel. A unique design that delivers high-output, low-maintenance operation. And quieter operation, too. With a lot less "chipper scream" — because of an operating principle that cuts way down on rotor rpm's without cutting down on output.

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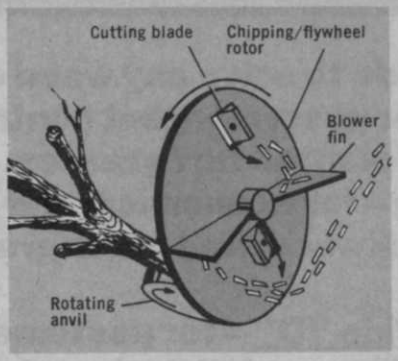
**Patent pending*



Here's how it works: As material is placed in the deep-throated hopper, the rotating anvil self-feeds the material to a high-speed chipping rotor. Steel blades, projecting through slots in the rotor, then slice the material into chips for immediate discharge by the integral blower. Very simple, but very different from other chippers.

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ISTC *(from page 10)*

"Shade tree evaluation," Dr. L. C. Chadwick
"Interpretation and use of the ISTC shade tree evaluation formula," Frederick R. Micha
"Should hardiness zones and location be made a part of the ISTC shade tree evaluation formula?" J. James Kielbaso
"Viewpoint of IRS and insurance agencies fo shade tree values," Ray Gustin, Jr.
"American Society of Consulting Arborists recommendations for modification of the ISTC shade tree evaluation formula," Dr. L. C. Chadwick

Thursday, August 22:

Morning and afternoon:
Four concurrent educational sessions
Session I — Utility Arboriculture
"Utility Beautility — Environmental Planning and Design," President-elect I. O. Bauer presiding, D. E. Holewinski, James H. Parsons
"No Spray R/W Maintenance," G. A. Kihl presiding, Dwain Bird, Jim Gibbs
Committee reports and election, President W. Jenkins presiding
Utility Arborists Association Luncheon: Wade Manning, speaker
"E. E. I. Research," Dr. Kenneth L. Carvell
Panel Discussion — "2,4,5-T hearings," H. M. Collins; "Tandex," P. King; "Banvel," C. Middleton; "Crenite," E. I. DuPont; "Tordon," Ron M. Townsend
"Tree injection," Leo Creed
"Green Industry Council (federal licensing)," Hyland R. Johns, Jr.
"O.S.H.A.," Jack Brown
Noise abatement
Recap, R. E. Abbott
Session II — Municipal Arboriculture
"The essentials of municipal tree care," James T. Oates
"Safe use of pesticides according to federal guidelines," Hyland R. Johns, Jr.
"Urban and city tree programs and problems," John Mixon
Field trip of Atlanta's plantings and municipal facilities
Session III — Commercial Arboriculture
"How to manage an arborist's business," Robert Felix
"Labeling and restricted pesticides," Henry Pratt
"Disposal and storage of pesticides and new EPA regulations," Hyland R. Johns, Jr.
"An efficient business system will increase your profits," Safeguard Business Systems

(continued on page 49)

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*Bonnieblue, Majestic, Sydsport and Birka Kentucky Bluegrasses and Koket Chewings Fescue.

For More Details Circle (105) on Reply Card

Urban Space Planning

Room for Recreation

By GERALD L. SMITH
Utah State University
Logan, Utah

Our cities are entering a new era of conflict that has the potential of being the crescendo of several major environmental crises. One issue, air and water quality, has and will be of principal concern whereas another will gain attention dealing with the mental health of the urban dweller. The demand for more open spaces in and surrounding our cities has risen sharply in the last few years. This has come about because of the increasing need for energy conservation placing restrictions on the freedom of individuals and families to travel by personal automobile. There is every indication that this demand will not slacken.

Cities are becoming larger, in many cases against the wishes of the government and the pressures of the strongest governmental actions that can be brought to bear against them. A great many people are distressed by this trend and believe that it will ultimately crush us all in a mass of people, concrete, traffic, and polluted air. A somewhat smaller, but growing group is worried about what it will do to man's mental health and sense of personal identity. By the year 2000 more than 80% of the increase in our population will live in urban areas. Within the next 15 years 30 million people will be added to our cities. This additional population is equal to the combined population of New York, Chicago, Los Angeles, Philadelphia, Detroit, and Baltimore.

Open space planning can actually be divided into two categories: 1) those areas dealing with the wild lands of our country such as are now administered by the National Park System, U. S. Forest System, and Bureau of Land Management, and 2) the lands that occur in pockets and corridors abandoned or bypassed by urbanization. In this paper I will deal mainly with urban open space planning.

Historic Overview

Urban parks and open spaces have a long history in this country. The actual development of them primarily took place, however, in the 19th century. There have been too many long periods of time within this century in which we almost stopped building parks. Two world wars and two lesser ones, a devastating depression and a postwar economic and development boom have resulted in over half the present population of this country being born in an era when parks and open spaces were scarcely being thought of. Historically, it is worth noting that while open space and park activities for the growing urban population were falling behind, an almost equally remarkable open space acquisition was taking place. The American conservation movement was making far-sighted advances in its success of setting aside large areas of land for a great system of national parks — mostly in the western part of the U. S. but now a growing number in the East. But to this day this land ethic has never been translated into the urban community. Our planning processes simply do not yet recognize the geriatrics of cities and neighborhoods, of parks and open spaces.

Approximately three to four years ago The National Park Service attempted to convince the major cities and towns of this country to increase the open space and recreational facilities within and surrounding these urban areas. In other words create new and revitalized urban parks and open space systems to satisfy the recreation demands of urban dwellers. This plea was largely founded on the increased strain of overuse the national parks and forests were feeling. Statistics show that in the past decade the total park area increased from more than 26 million acres to about 30 million. This increase, however, becomes insignificant compared to the visitor usage which jumped 150 percent from more than 72 million to almost 180 million.

There is some abatement in the form of gasoline shortages which will no doubt restrict the amount of personal automobile pleasure driving for any great distances. This may mean a reduction in terms of impact at the national park level but more realistically means a shift in usage, and demand, to local and state recreation areas. This change of recreation use could greatly increase mental stress of urban dwellers. Both because of lack of mobility to get to parks and recreation areas and the increased contact with masses of people.

Yet another second-order crisis appearing on the horizon linked with the lack of open space recreation areas at the local level and immobility is that of an increase in BTU and kilowatt hour usage. With the steady increase in leisure time more people will potentially be spending many more hours at home. This then could have a significant influence in terms of increased energy consumption to run air conditioners, television sets and radios, home cooking, water use, lighting, as well as various outdoor tools and equipment. Many of our major cities have already been experiencing for years electrical power shortages during the summer months.

Social and Physical Integration

Urban open space today cannot be thought of as a land use separate from other activities within the city. There must become a conscious effort to integrate open space and park development with patterns of urban movement, air rights, and areas for living, shopping and working. Social and physical planning

must become a single process.

Historically, open space has been thought of as wilderness or parks, playgrounds and roadside areas. This definition, however, must be changed to one that is more flexible with the direction being toward an open space that is adaptable to a multitude of uses (Central Park in New York City or Golden Gate Park in San Francisco).

There has been a recent rebirth of the value of linear open space. These areas, or linkages, can be multi-purpose in the sense of offering not only easy and safe corridors from park to park or home to school and shopping but also sitting areas, small play lots, fishing, birdwatching, bicycling, bridle paths, etc. The land that could comprise this form of open space might be canals, stream beds, flood plains, old rights-of-way, trails, and little-used secondary roads. When aggregated, it can become rather sizable in acreage and offer a very diversified set of recreation activities within easy access of urban dwellers.

We see several parks, large and small, in cities today and they stand out on a city map as green emeralds in an otherwise patchwork of land use colors. They are isolated except for the immediate neighborhood around the park. Access is almost solely by automobile or mass transportation, when it exists, for those people in other sections of the city. By developing a linear open space system threading throughout the city by the means mentioned above, accessibility could be offered to the entire city along with the side benefits gained from many uses occurring along the corridor system itself.

People to the Parks

One of the primary words in physical planning of our cities is mobility. The Secretary of the Interior has been studying efforts to locate state and regional parks and open spaces closer to the major urban centers. This is being done in conjunction with state and locally subsidized mass transportation systems to increase accessibility of parks and open spaces outside our cities to low income — mostly immobile — central city families. The State of Utah, like most states, has recently passed legislation offering the opportunity to increase sales tax to help finance this type of statewide transportation system.

There should be an immediate program of action initiated and the first step should be the establishment of a broadly expanded and accelerated open space acquisition program. Through effective planning processes the acquisition of open space must be related to patterns of urbanization. The need is for open space to occur where high concentrations of people are; land which is accessible physically, psychologically, and socially.

The old fashioned concept that parks could not be provided for in our densely built-up cities because of lack of land is simply not true. A study of the ten largest cities in the country revealed that, on the average, 20% of the city is undeveloped and uncommitted land. Some open space strategies, along with this statistic, being promoted recently are concerning the reclamation of valuable natural tracts of land which exist within or near urban areas for public use. These would include river fronts, harbors, old military installations, and other types of federal lands. Other newly found areas involve air rights above already existing land uses such a sewage treatment plants, downtown expressways, roof tops, etc.; closure of little used streets; conversion of cemeteries to memorial parks.

Central Park, Golden Gate Park, Boston Commons, Chicago's lake front are among the legacies of open space bequeathed to today's generation by the foresight of late 19th century planners such as Burnham, Olmsted, Cleveland and Jensen. Let us hope that the next few generations can have the same chance to have such open space systems in existence to enjoy.

> "That these wild lands shall live and bloom for 10,000 years to come, is our dedication to human culture and our legacy to our children, so that they, on a warm spring day, can feel peace in a sea of grass, watch a bee visit a shooting star, hear a sand-piper call in the sky, and understand the incomprehensible symphony of life."
>
> Dr. Hugh Iltis

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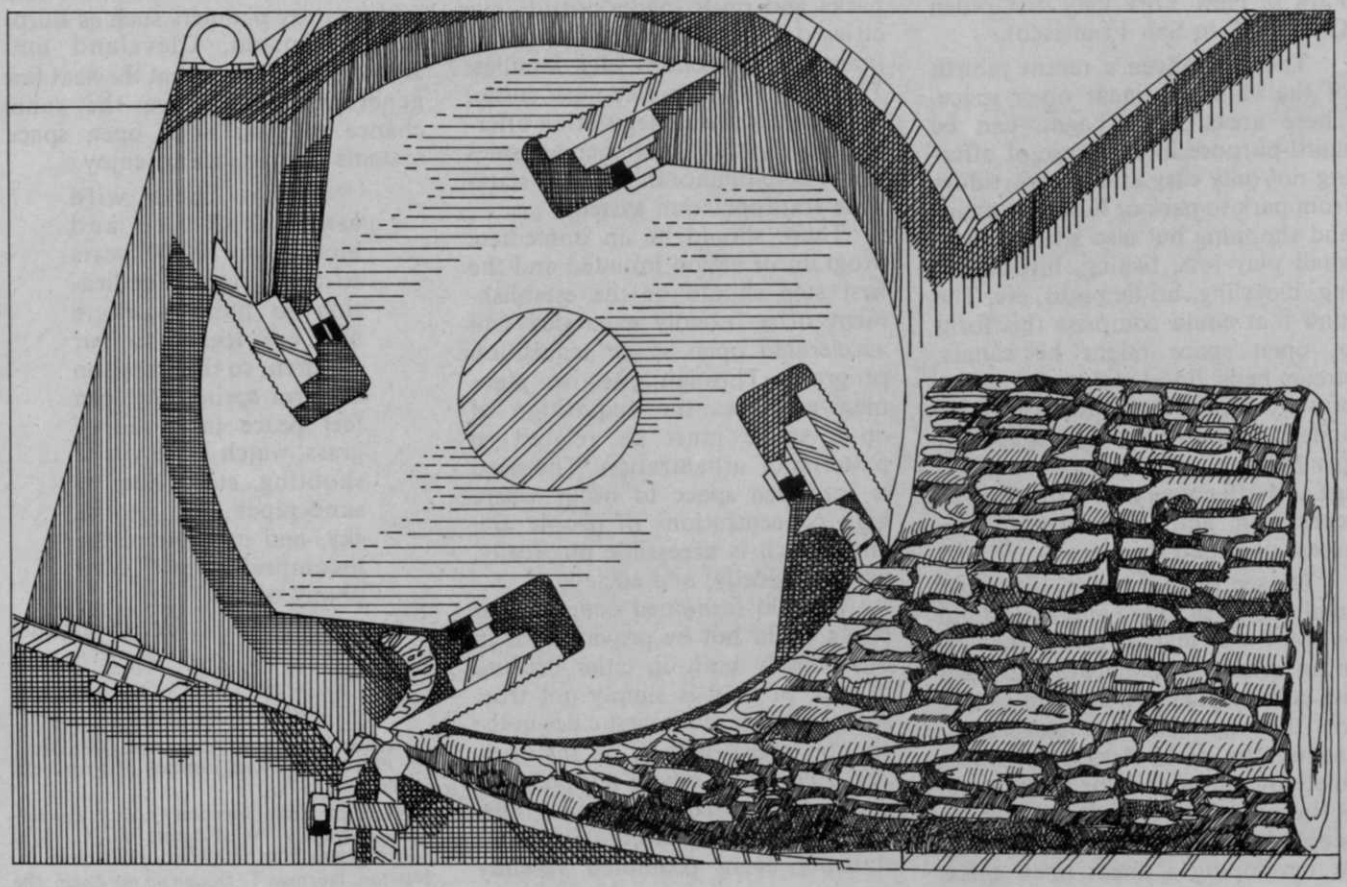

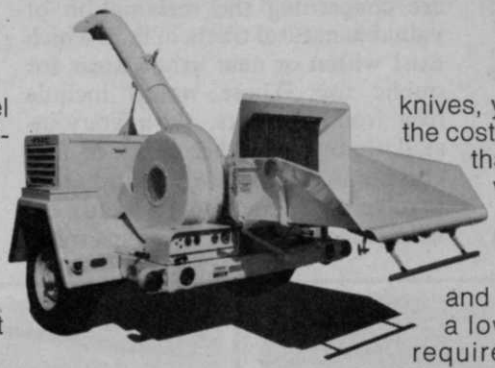

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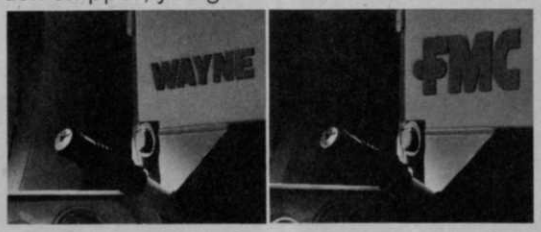

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irrigation '74

FERTIGATION: Double Duty

". . . an excellent complement to our regular fertilizing methods"

By LARRY A. WEBER*

One of the more serious problems facing a golf course superintendent is finding the time to fertilize during the season. A little over a year ago, after the pro shop and I failed to reach a common shut-down time for fertilizing, I decided it was time to look into other methods of fertilization.

The method that showed the most promise was fertigation. Fertigation is the practice of applying fertilizer through an irrigation system.

Inverrary Country Club is a 54 hole golf complex within a 1000 acre development in Ft. Lauderdale, Florida. It includes two — eighteen hole championship courses and one — eighteen hole executive course. The Jackie Gleason Inverrary Classic golf tournament is played here each February.

I chose the executive course as a trial area for fertigation. The course covers 65 acres and has a perfect wall to wall Toro Varitime irrigation system. The greens are planted in Tifton-328 Bermudagrass, fairways and tees are planted in Tifton-419 Bermudagrass and the roughs are seeded in common Bermudagrass.

The fertigation system consists of a few basic components. These include:

1. 1200 gallon storage tank with 6 ton capacity.
2. In line filter.
3. High pressure injector pump.
4. Check valve to prevent water pressure from going back into fertilizer tank.
5. Electric pump start and isolation switches.

My vertical shaft turbine pump station requires a high pressure injector pump. With a centrifugal pump station, the high pressure injector pump can be replaced with a metering valve. The isolation switches allow the flexibility of fertilizing greens only, fairways only or roughs only or any combination of the three.

The fertilizer used was of two analysis. During the summer months I used 12-0-6 with magnesium, manganese, and iron. In the cooler months I used 11-0-5 with same minors to prevent salting out at the lower temperatures. Phosphorous was not applied throughout the year due to an adequate amount in the soil as indicated by soil tests.

The rate of application of fertilizer is based on the number of days irrigation is needed. Our average rate is 20 days per month. We used 13 gallons of fertilizer per hour for 11 hours per night or a total of 143 gallons of fertilizer per night. I used this low rate to compensate for changing wind conditions, to keep the soluble salt level down and to keep the growth rate of the grass at a constant level.

The total amount of fertilizer used throughout the year was far less than I expected. I use a total of 63 tons of the liquid blend, 2 tons of granular 7-3-7 greens mix and 10 tons of Milorganite on slopes and trap fingers. The dry material was used during periods of heavy rainfall when I did not need to irrigate.

The actual amount of fertilizer elements used over the year proved very interesting. The total amount of Nitrogen applied was 250

(continued on page 28)

*The author is the golf course superintendent of Inverrary Country Club where the Jackie Gleason Inverrary Classic is played in February.

For Your Irrigation System

". . . significant labor and money saving advantages"

By MAX A. BROWN*

Turf managers for years have felt that applying fertilizers lightly and frequently had many advantages over heavy, infrequent fertilizing. So called "spoon feeding" of turf areas eliminates cycling between heavy flushes of growth soon after fertilizing and hungry, weak turf when the next application is due. "Spoon feeding" also minimizes the risk of heavy losses of fertilizers from surface erosion or leaching when heavy rains occur.

But applying fertilizer costs money. The labor and equipment required to apply dry fertilizers is calculated to be between $5 and $10 per ton for bulk handled materials and over $10 per ton for bagged fertilizers. On an area basis it costs between $1 and $3 per acre each time you apply fertilizer. Therefore, most fertilizer programs become a compromise between the frequency we would like to use for best results and what we can practically afford in time and money.

A reasonably designed automatic irrigation system provides the ideal tool for applying fertilizers lightly and frequently without labor costs. The automatic irrigation system is by far the most expensive piece of mechanical equipment on the golf course. In fact it usually costs more than all other pieces of mechanical equipment combined. This system can apply fertilizer to all irrigated areas as well as water them.

Fertigation, the coined word for the practice of applying fertilizer through an irrigation system, involves a "technological marriage" between the solutions fertilizer industry and the irrigation design and equipment industries.

Liquid fertilizers are not new. They have been a major factor in the fertilizer industry for many years and today account for about 30% of all forms of fertilizers. Irrigation equipment and design have evolved considerably in the past ten years. Quite acceptable uniformity and dependability can now be expected from these systems. The "technological marriage" of these two industries is consumated by the technology necessary to precisely introduce the liquid fertilizers into the irrigation system.

Injection Methods

Fertilizer can be injected into the irrigation water flow at any point. However, the most successful systems have been those in which the fertilizer is injected into the main irrigation line. Those systems with independent injection into each sprinkler or group of sprinklers have been troublesome.

A requirement for uniform fertigation is that there be a uniform concentration of fertilizer in the irrigation water. This can be achieved in two ways, with one being more versatile and expensive than the other.

The ultimate system of choice involves a flow sensing device in the main irrigation line. This device precisely measures the flow rate of water. It then causes fertilizer to be injected into the water in a precise, preselected concentration regardless of whether one sprinkler or many are operating. As the main-line flow rate decreases at the end of a watering cycle it automatically shuts off. Once the main-line flow

*The author is a consulting turfgrass agronomist for individual golf courses in southern Florida, the Caribbean and for Liquid Ag Systems, Inc.

Liquid fertilizer is stored in a corrosion-resistant tank and injected directly into the irrigation water. All nutrients normally applied to turf in dry fertilizers can be applied through the irrigation system.

resumes, the fertilizer injector will automatically start up. A monitoring device can be installed downstream in the main-line which will shut the system off if the fertilizer concentration varies from the preselected level. Several systems of this type are presently on the market.

The less versatile and less expensive alternative is to use a constant volume injection device and try to maintain a constant main-line flow of irrigation water. This can be done by manipulating the irrigation controls so there are the same number of sprinklers of one type operating any time the injection device is operating. This system can also be installed so that it is automatically started and stopped.

The above described systems are necessary when injecting into a pressurized water line, such as the discharge side of a turbine pump. However, when centrifugal pumps are used the fertilizer can be simply and inexpensively metered into the suction side of the pump. This system can also be valved to operate automatically.

Most failures of fertigation systems result from a) poor injection methods and b) fertilizer problems. Once a thorough study is made of injection methods, a good understanding of available fertilizers and their limitations can be achieved.

Fertilizers

The fertilizer must be stored in a corrosion resistant tank near the injection device. Most success has been achieved using clear solution fertilizers, rather than suspensions. These materials must stand prolonged stationary storage without agitation.

Some superintendents dissolve dry fertilizers in water to produce their own liquid fertilizers. This procedure is very time consuming and troublesome. It eliminates much of the labor saving advantage of fertigation. Prescription mixed liquid fertilizers eliminate handling labor and are comparable in cost to dry fertilizers.

All nutrients normally applied to turf in dry fertilizers can be applied through the irrigation system. One occasional exception is phosphorus. This nutrient reacts with certain waters high in calcium forming a cloudy, white precipitate which can coat pipes and sprinkler nozzles. Phosphorus cannot be included in liquid fertilizer mixtures containing magnesium.

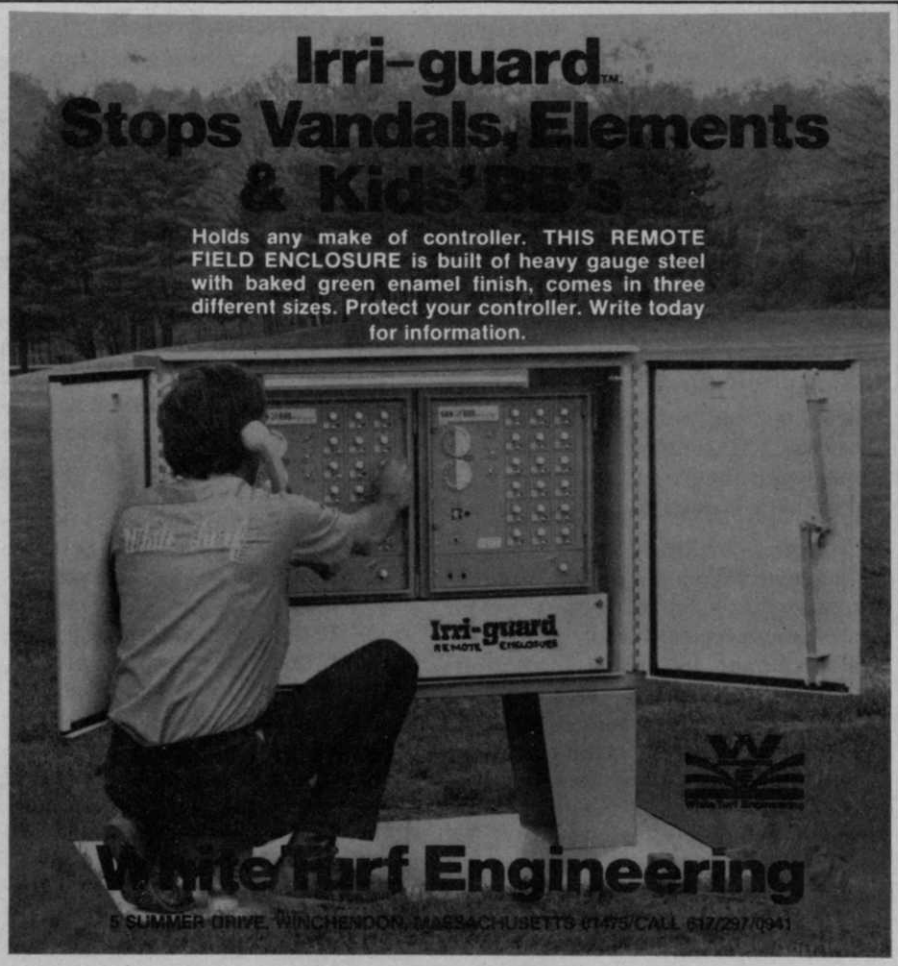
Those nutrients which are readily leached in sandy soils such as nitrogen, potassium, magnesium, and sulfur can be easily applied. The complete spectrum of minor elements can also be included with no problems.

Advantages

Fertigation is a significant labor saving technique. Fertilization is done automatically and rates are adjusted by turning a dial. There are no bags to lift and no dust. Fertilizer is usually delivered directly to your tanks by the supplier and moved by pumps and hoses. The need for large fertilizer storage space is eliminated.

There is no danger of burn to turfgrasses since liquid fertilizers are greatly diluted with irrigation water. Wheel tracks and speckling of turf burned by fertilizer granules is eliminated.

Fertigation does not conflict



"Jobe's TREE FOOD SPIKES save time, labor and money."

says Delos A. Bailey, owner of Del-Mar Landscaping Service, Bloomington, Minn.

George Mann, left, and Chris Danielson, Del-Mar Landscaping Service, Bloomington, Minn., fertilize their customers' trees with Jobe's Tree Food Spikes.

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with golf play. Golf courses, closing a portion of the course to golfers when fertilizing, can significantly affect revenue at busy times of the year.

There is strong evidence that less fertilizer is needed to maintain healthy turf under fertigation. Certain golf courses on very sandy soils have experienced up to 50% less fertilizer required under fertigation when compared to their normal dry fertilizer program.

Disadvantages

Clear solution liquid fertilizers are limited in the total amount of plant food they can contain. Solutions containing large quantities of potassium, for instance, may "salt out" at low temperatures. Users must be aware of the "salt out" temperature of each fertilizer grade they use.

It is difficult to apply large amounts of fertilizer through an irrigation system during rainy weather. Care must be taken to apply phosphorus through fertigation only if it will not react with chemicals in the irrigation water and other fertilizer nutrients.

Distribution

Uniformity of fertilizer distribution through fertigation is only as good as the irrigation system. This can be good but is sometimes quite poor. However, we are not comparing with a perfect standard. Most dry fertilizers are bulk-blended granular materials applied with centrifugal-type spreaders. Uniformity with this type of equipment is normally quite poor especially on variable terrain like a golf course where no straight lines for uniform overlapping are possible.

Segregation of materials occurs in dry fertilizers because of differences in particle sizes, shapes and densities. Heavy particles are thrown farther and small light particles drop near the applicator. With liquid fertilizers each individual drop contains the same plant food content.

Fertigation will not fit every turf situation and will not match every turf manager's program. But the significant labor and money saving advantages, and the enthusiastic acceptance by most superintendents who have tried it, lead me to believe that a major portion of large-area turf fertilization will be done by fertigation in the near future.

For More Details Circle (130) on Reply Card

Chipco Spot Kleen is the systemic fungicide for prevention and control of dollar spot, Fusarium blight, large brown patch, copper spot and stripe smut.

Its long residual control makes a program based on Chipco Spot Kleen effective and economical. And Chipco Spot Kleen has a wide margin of safety to turf.

Once you use a Chipco something, you'll use Chipco everything.

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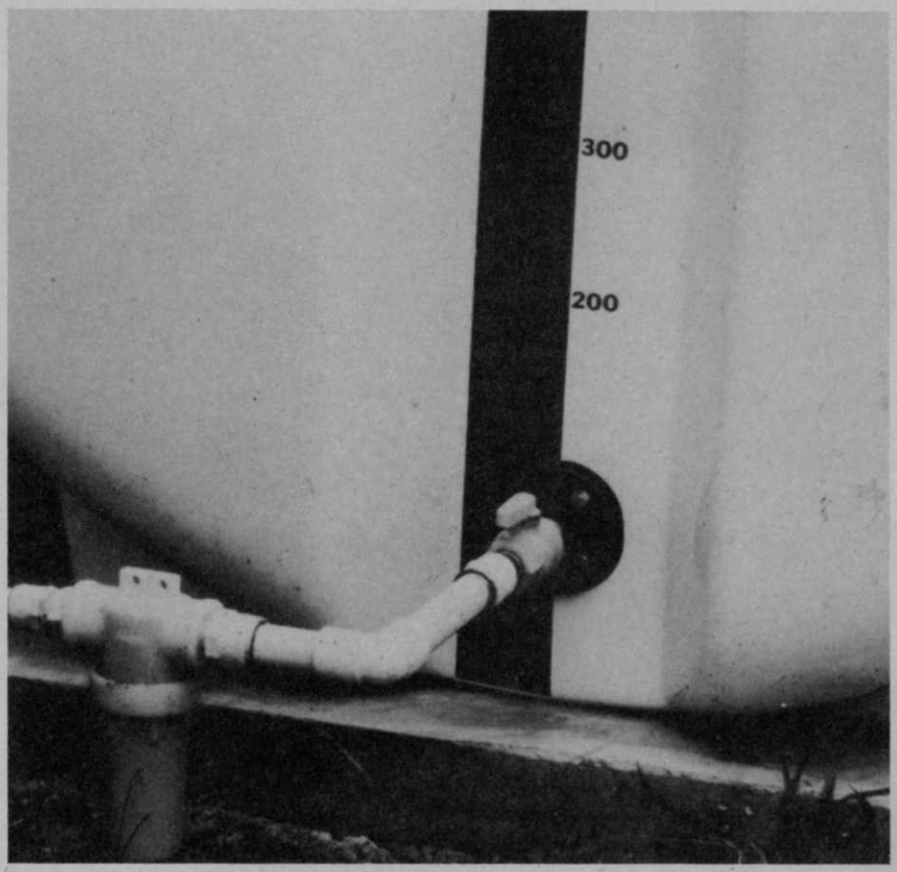

Fertilizer, flowing directly from the tank to the irrigation system, can be injected in a precise, preselected concentration regardless if one sprinkler or many are operating.

IT'S A FACT...

APPROXIMATELY 80% OF PLANT NUTRIENTS removed in crops fed to livestock is returned to the soil as manure.

THE U.S.D.A. conducted soil erosion tests and found that soil on steep slopes without grass will erode at about 7 inches in 11 years. With grass it'll take about 34,000 years.

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FERTIGATION (Weber)

(from page 22)

lbs/acre or 5.74 lbs/1000 sq. ft. This is about one-half the amount recommended by our state for our area. Their recommendation is 9-12 lbs. N./1000 sq. ft./year. Likewise, the amount of potassium was greatly reduced. I applied 112 lbs of K20/acre or 2.57 lbs/1000 sq. ft.

The most pleasing results of fertigation were in the reduction of costs. The total amount spent for fertilizer figured out to $80.37/acre/year. The average cost per ton of the material used was $60.00 to $80.00/ton. With the ever increasing cost of fertilizer materials, the liquid system looks much better all the time.

Some of the main advantages of fertigation are:

1. No labor costs for spreading fertilizer.
2. No disruption of golf play.
3. No storage area required as for dry fertilizer.
4. Grass can be maintained at an even growth rate.
5. Cost of liquid is less per ton than dry.

There are also a few disadvantages, too.

1. It may be necessary to irrigate just to fertilize.
2. Uneven distribution of sprinklers — some running longer than others, therefore putting out more fertilizer.

At Inverrary, our play is very heavy in the winter months. This is also the time of year when the Bermudagrass requires more fertilizer. This is why I chose fertigation.

To see if fertigation was the best method of fertilizing, I had to compare it to the conventional methods of fertilizing. I have gone on a complete Scotts program on the West course and on the East course I am on a granular dry fertilizer program. It will be several months before I have enough data to accurately compare the three methods.

I don't feel at this time that fertigation is the complete answer to all our fertilization problems. I do feel that it is an excellent complement to our regular fertilizing methods especially during the winter months in Florida.

For More Details Circle (114) on Reply Card

Installing underground utility lines and sprinkler systems can be a problem for grounds maintenance people, landscaping contractors, and golf course superintendents.

Ditch Witch would like to help.

At most sites, it's possible to make underground installations of telephone and electrical cable — even a complete sprinkler system *without* having to dig a foot of trench across your expensive turf. Ditch Witch vibratory plow equipment can do the job quickly and efficiently.

Of course, in some cases, due to the soil conditions and other factors, trenching is required.

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Golf course irrigation installation

A family affair for 'Formost'

"Everyone has to find a specialty to be successful these days," says Ken Cloud, and his Formost Construction Company has certainly been successful in carving out its particular niche. Formost, headquartered in Venice, California, is one of the top two installers of golf course sprinkler irrigation systems in the country and, Cloud says, probably installs more systems on existing courses than anyone else.

"You've got to be really good at one specific thing," Cloud explains, "and the only way to have that kind of knowhow is to do it every day. That's why we specialize in golf course irrigation only, and after almost 30 years in business, we know what we're doing."

Much has happened to golf course irrigation since the Clouds first started in business in 1937, and the family has been a part of the changes. "When my father started out putting sprinkler systems in residential lawns and gardens, I used to thread galvanized pipe by hand," Ken says. "When asbestos-cement pipe came out, we thought that was the living end, but we didn't reckon on plastic pipe, which has now revolutionized the industry."

Ken is president of Formost, the twelve year successor to the business the Clouds have been in for 28 years. It is truly a family business, involving one of Ken's brothers and also his three sons and numerous nephews. His oldest son, Charles "Scott" is in charge of Western Division. "Right now we have three generations of Clouds in the business," he beams.

The Clouds graduated from residential work, mostly on irrigation systems for the estates of the wealthy, like movie stars Robert Stack and Dick Powell, to freeway and commercial work back in the 50's.

In the early 60's the family business began to move toward golf courses, where the market was wide open and growing. "There might be four companies in the entire field doing strictly golf courses," Ken says. "We saw a market for an outfit that would do a better job, faster, and install consistently reliable equipment," he explains. 'In other words, the 'Foremost' golf course irrigation installer, and that is what we've become."

But climbing to that pinnacle involved a lot of investment, hard work, and especially inventiveness. Ken, a born inventor, started early adapting existing machines to the special necessities of golf course irrigation installation, to get the job done better, faster and with less labor.

"About 20 years ago I developed a small ditch digger powered by a Wisconsin engine that was especially adapted to irrigation work," he tells. "It was suggested that I get patents and manufacture the thing, but I was too busy digging ditches with it, and probably blew the biggest chance I ever had." At least five or six companies are now making out nicely manufacturing machines similar to the one Ken developed.

As the years went by, Ken continued developing equipment to help him install irrigation systems better. One of the biggest labor-savers has been the "pipe-puller." This machine was developed by Ken at a cost of $65,000 more than two years before similar machines were brought onto the market. It allows Formost to lay plastic pipe up to 2½ inches in diameter without digging a trench at all.

The "puller's" blade simply "slices the turf down to the level the pipe is to be laid at, and then, through a special tube behind the slicing blade, the pipe is snaked into the slit continuously. Since the process opens up just a narrow slit in the turf, tamping it back into place is a simple matter, and the course is ready to play almost immediately.

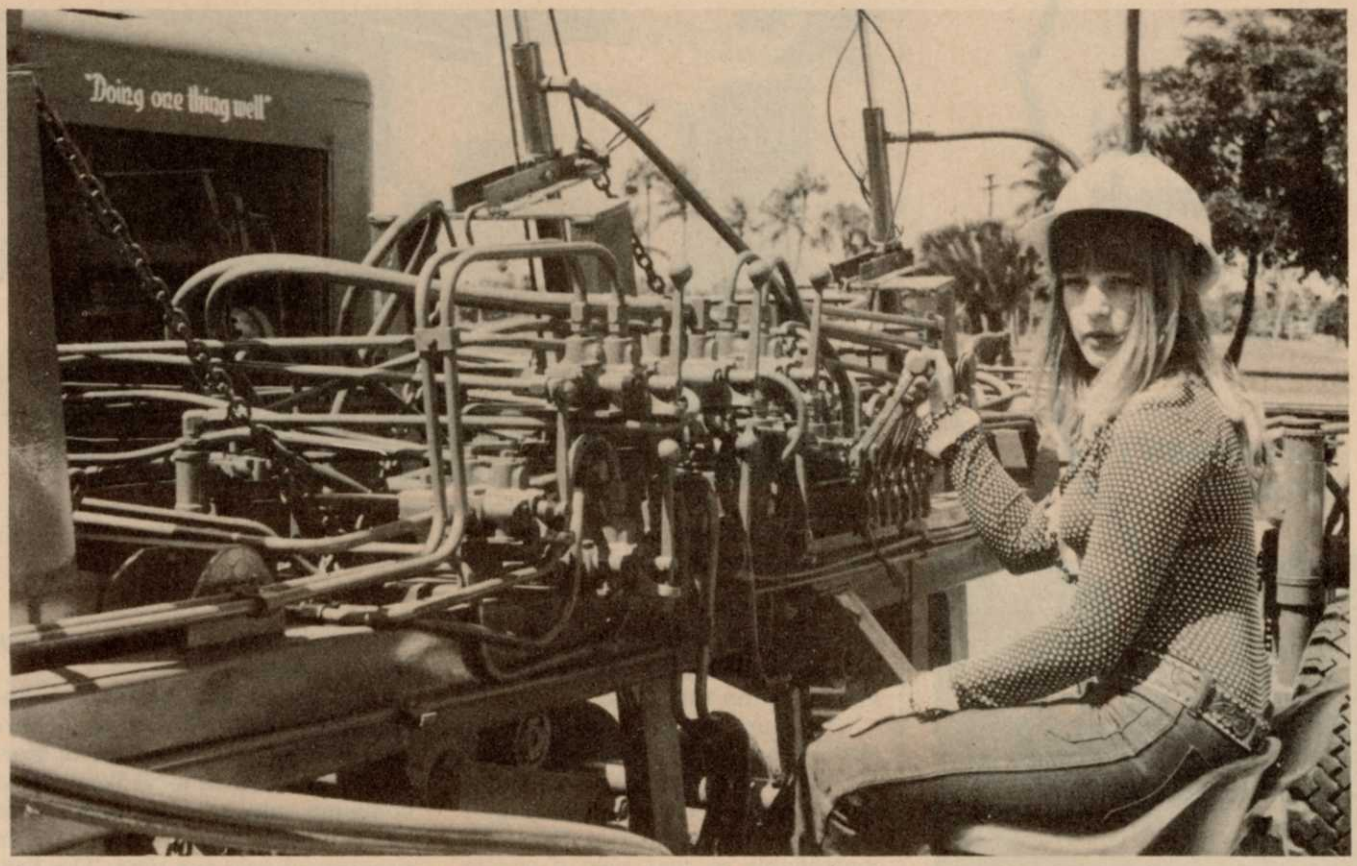
This is a matter of pride with the Clouds. In these days of sky-high costs, closing a course down for repairs during playing season could well close it down permanently. "We've never closed a fairway for an installation job," Cloud boasts.

As an example, Cloud cites the Miami Shores Country Club, where the firm's Florida Division completed a job last March. The job had to be done during the height of the club's season, and superintendent, Dave Buxbaum, said "I wanted that course continuously playable!"

"They didn't lose a single round of golf during that irrigation installation," grins Ken's brother Cecil Cloud, Formost's Florida Division manager, who oversaw the Miami Shores job.

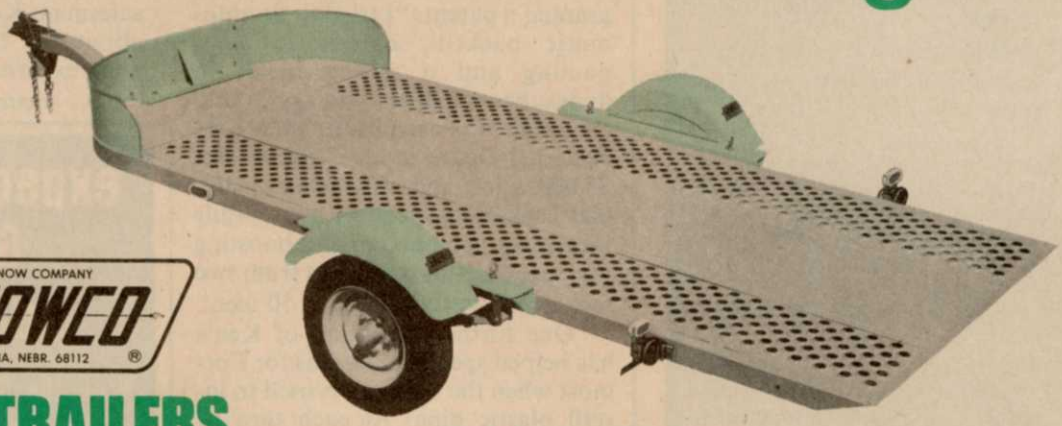
Where hard-rock coral just beneath the surface prevented the use of the pipe "puller" for the main lines and some laterals at Miami Shores, Cecil had the crew dig a trench with the other end of the same machine, a powerful continuous ditcher. Then, once the pipe was laid in place, another Ken Cloud invention moved in to backfill and compact the trench. Called the "Spider" by those who work with it, the 11 foot wide mechanical monster was completely designed by Ken and built to his specifications.

The "Spider" is powered by a standard 6-cylinder industrial engine, which drives the various moving parts through a series of hydraulic pumps and motors. The machine has three sets of augers that completely backfill the earth into the trench as the machine passes over it, each one followed by a hydraulic "tamp" that packs the dirt in 12 inch lifts solidly over the pipe.



"Doing one thing well" is Formost's slogan, here decorating the "Spider," a combination backfiller-compactor invented by Ken Cloud. Also decorating the machine is Mrs. Bruce Pettingill, wife of the machine's operator, as she demonstrates how one of the 18 hand levers controls the hydraulic pumps and motors connected by a maze of tubing.

The Low-Down on Hauling...



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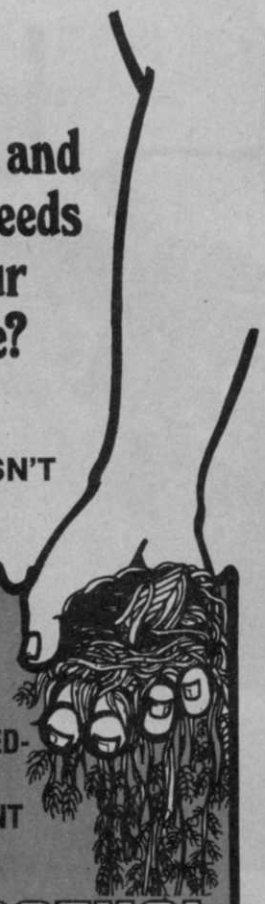

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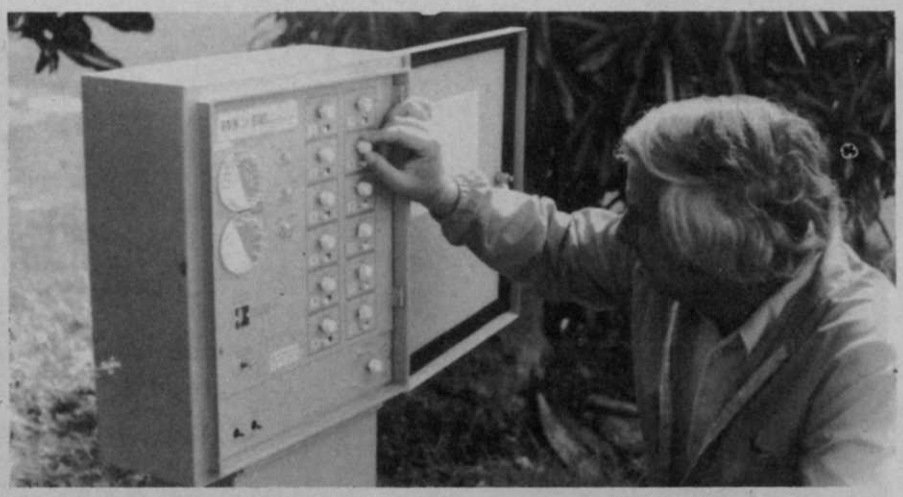

Manual control of sprinklers on Miami Shores green is effected by course superintendent Dave Buxbaum via controller overlooking the green. Visibility of the green from the controller prevents accidental dousing of golfers.

One man can operate the 18 controls while riding the "Spider" on its high-flotation turf tires.

The huge machine replaces four men on the job, and does even a better job of compacting, virtually eliminating the bothersome settling of trenches after installation. It's fully controllable so that even if you're backfilling a curved trench it can do a perfect job and the augers can be controlled so as not to scalp the turf on uneven terrain, yet pick up almost every grain of dirt and backfill it into the trench.

Ken is especially proud of his invention, for which he has been granted a patent. "I tried to tie automatic backfill, automatic compacting and a strong belief in hydraulics together," he says, "and the result was even better than I expected. I figure it saves us at least $5,000 a job and eliminates a $10,000 backfill machine to boot, while increasing compaction and boosting our speed in this operation from two feet a minute to as high as 50 feet."

One further invention of Ken's has helped speed operations for Formost when the "puller" is used to install plastic pipe. At each turn or corner a hole still must be dug to install an elbow or tee joint. "There might be 1,000 or 1,300 of these holes on any one course," Ken says, "and we needed a neat, clean, fast way to dig them." The job formerly took 15-18 minutes by hand, or 7-8 minutes using a backhoe. Ken's mechanical "hole-puncher" actually "saws" out a wedge of turf and dirt, exposing the area of the joint. Once the joint has been made, the wedge is replaced in one piece over it, preserving the turf as well as speeding the operation.

But speed and neatness of installation aren't the only factors contributing to the growth of Formost from a small local West Coast company into a major nationwide concern with two or three jobs in progress at any one time. The firm now operates separate Wisconsin and Florida divisions, and operations in Mexico City and Tokyo are planned for the near future.

Salesmanship has been very important. "I guess you'd have to say our sales story involves three basic factors," says Formost's foremost salesman: Ken Cloud. "First, we tell about the family firm, its history and experience in installing irri-

(continued on page 35)

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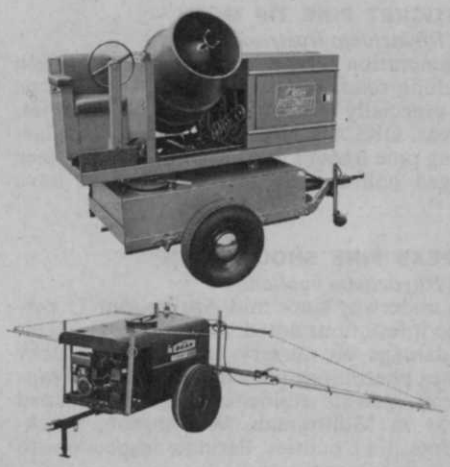
The grass is always greener...and with good reason



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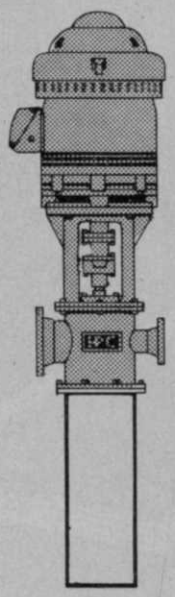

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insect report

TURF INSECTS

SOD WEBWORMS

(Crambus spp.*)*

SOUTH DAKOTA: Found infested 128,000 acres of rangeland in Corson, Dewey, and Ziebach Counties; 20,000 acres have been destroyed, additional 50,000 acres being destroyed.

BENEFICIAL INSECTS

ICHNEUMON WASP

(Bathyplectes curculionis)

OHIO: Parasitized 10 percent of *Hypera postica* (alfalfa weevil) larvae collected in Clarke County alfalfa field. WEST VIRGINIA: Four adults of this alfalfa weevil parasitoid collected in 25 sweeps of alfalfa in Cabell County. This is a new county recovery. NORTH CAROLINA: Annual survey for parasites of alfalfa weevil extended to include Buncombe and Macon Counties; *B. curculionis* collected in these counties extending known range in State. *B. curculionis* parasitized 8.6 percent of *H. Postica* larvae collected in Buncombe County, 5.2 percent of those collected in Macon County. Survey indicated dramatic increase in percent parasitism in Rowan, Wake, and Ashe Counties since 1972. Heaviest parasitism of *H. postica* larvae was 58 percent in one Rowan County field. *B. curculionis* released in Wake, Rowan, and Ashe Counties during 1971.

TIPHIID WASP

(Tiphia vernalis)

WEST VIRGINIA: Adults of this *Popillia japonica* (Japanese beetle) parasite noted near Elkins, Randolph County.

LADY BEETLES

INDIANA: Half-grown larvae of several species observed in wheat fields and roadsides in Gibson County.

TREE INSECTS

SOUTHERN PINE BEETLE

(Dendroctonus frontalis)

ARKANSAS: Still problem in southern area of State. Reports from Arkansas Forestry Commission indicate salvage operations in Ashley and Union Counties in March and April totaled 697 stems removed, 113 cords of pulp wood cut, and 29,000 board feet of saw timber cut. Flights and subsequent ground checks in Lafayette and Columbia Counties showed no new infestations evident beyond previously known infested area.

NANTUCKET PINE TIP MOTH

(Rhyacionia frustrana)

ALABAMA: First-generation larvae mostly pupated in pine trees on lawns and along roads in northern area. Infestations heavy in some areas, especially Decatur and Morgan Counties, and light in other areas. OKLAHOMA: First-generation larvae moderate in young pine trees (3 feet tall or less) in Latimer County; larvae ranged half to full grown and some have already pupated.

EUROPEAN PINE SHOOT MOTH

(Rhyacionia buoliana)

OREGON: Surveys underway since mid-April about 75 percent complete with no infestations noted. Along with visual inspection for larval damage on nursery grown pines, sticky traps with synthetic sex pheromone placed in host trees. Traps placed in 26 nurseries, private residences, and landscaped areas of public parks in Multnomah, Washington, Clackamas, Marion and Umatilla Counties. Periodic inspections to be made during adult emergence period.

FORMOST *(from page 32)*
gation systems. Next, we talk about the courses we've done, all the way from the famed Pebble Beach (Bing Crosby Pro-Am) and El Dorado (Bob Hope Classic) courses in California, through Howard Hughes' Desert Inn course in Las Vegas and even the pitch-putt course at the San Clemente White House.

"The third facet of our success story would probably have to be the equipment we install. Since we stand behind the entire installation, including the pipe, sprinklers, timers, and other equipment, we have to be sure of what we're installing, as well as how we do it.

Although the golf course superintendent, in the case of existing courses, of the architect, on new courses, often recommends manufacturers, Formost installs Rain Bird sprinkler equipment on most installations.

"It's simply that the Rain Bird people stand behind their equipment with 48-hour service, and that makes our job a lot easier," Ken says. "It's the kind of service that allows us to give 18 and 24-month guarantees on our installations, instead of the usual 12 months the other contractors give.

At the Miami Shores Country Club, the 13 Rain Bird Controllers Formost installed are used so that each unit controls four greens or two fairways. Location was important — each unit is placed so that the operator can see the entire area controlled by that unit. "That way we avoid wetting down golfers who might happen to be on that green or fairway where we're watering for some special reason," Buxbaum says.

Greens and tees are watered by No. 51 rotor pop-up full-circle and No. 47 part-circle rotor pop-up sprinklers, while fairways are handled by more than 400 No. 81-B rotor pop-up heads. The intire system is connected by a network of 66,000 feet of PVC mains and laterals. Three 40-hp, 350-gpm, Tait turbine pumps charge the system with 125 psi pressure. Rain Bird Specialty Valves are used at the pumpshouse to take the shock out of the pressure system and to assure constand flow at varying pressures for the main and lateral lines. More than 400,000 feet of wire tie together the Rain Bird RC-18 and RC-23 controllers on fairways and SC-12 Satellites controlling the greens.

An all-electric irrigation system, the Miami Shores job is installed for maximum lightning resistance. "Until recently, everyone was worried about lightning damage to electric controllers," Cecil Cloud says, "and hydraulic controllers were often chosen instead of the simpler, easier-to-maintain, more accurate electric units.

"Past failures of electric systems in lightning-prone areas like Florida,"Ken adds, "have been due to poor installation rather than the equipment itself. Proof of this is our zero-failure track record on electric systems." "I've installed three courses recently with electric controllers and lightning protection," Cecil chimes in, "and even with lightning strikes within 100 feet of a controller, we've yet to lose one."

The new system by Formost and Rain Bird replaces a semi-automatic setup of quick-couplers down the center of each fairway, and pop-up heads on the greens, all controlled by a single valve. "We had no actual control," Buxbaum says. "We turned that valve and all the sprinklers let go at the same time. Now we can eliminate the equivalent of a man and a half of labor for watering every day, and the system doesn't take a day off, need a vacation or get sick. And best of all, we now have total control of watering that gets right to the edges of every green and fairway."

"We looked a long time before we chose Formost to do this job, and Rain Bird to be the equipment they put in," Buxbaum says. "It took over two years to make a decision. After looking at all the different systems we could find, we decided installation of the very best by the very best would cost no more in the long run. In that case, Formost and Rain Bird was the only choice we could make."

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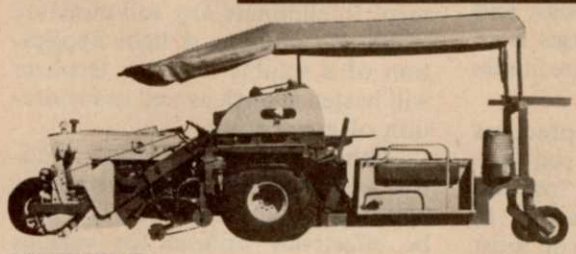

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Sod, Water, and A System

By HENRY W. INDYK, Extension Specialist in Turfgrass Management, Rutgers University

The production and use of sod for the establishment of an instant turfgrass cover is not of recent date. However, the progress and developments which have led to the sod industry as we know it today have primarily come about within the last 10 to 15 years. One of the most striking developments has been the rapid emergence of sod production as a highly specialized and sophisticated industry from the so-called "pasture stage" of long standing. The "pasture stage" was characterized by fence rows, dairy and beef animals as mowing units, as well as fertilizer manufacturing plants and application equipment and a "potpourri" of plant growth most of which would be difficult to classify as turfgrasses.

From an economic standpoint, grazing of sod fields provided the distinct advantage of utilization of clippings. Clippings are somewhat of a by-product in the present day industry. The "pasture stage" has been forced out of existence in most areas but remnants of this stage still can be found in certain parts of the country.

The new industry became known as nursery sod or cultivated sod in contrast to the "pasture sod." Sod producers became quite sensitive to this distinction. The primary stimulus for the rapid advancement of the nursery or cultivated sod industry was the realization that there was a demanding market for a high quality product. The sod industry quickly and successfully responded to satisfy this market. The high quality sod which became available acted as a "catalyst" in stimulating greater interest in the use of sod. Striking improvements in sod quality were achieved through the adoption of intensive cultural practices, improved turfgrass varieties of known genetic purity and high quality seed.

Sod growing tends to be concentrated close to the area of use, i.e. close to its market or point of utilization. The major marketing area of a specific sod operation is principally within a 100 mile radius of the point of production, although some may be shipped for greater distances. Two major reasons can be cited for such localization of production and marketing:

1. Sod is a highly perishable product which will deteriorate very rapidly after harvesting if not utilized immediately, particularly during the warmer seasons of the year.

2. Minimize transportation costs and in terms of present day concerns, conservation of energy as well.

Accordingly, you will find sod farming concentrated very close to areas of residential, industrial and recreational development. Consequently, this means production in high value land which becomes an important cost of production factor.

A superior quality sod is characterized by many different factors. An attractive appearance is of paramount importance to a purchaser of sod. From the standpoint of the producer, in addition to appearance for marketability, sod must be dense with a well developed root and rhizome system to facilitate harvesting and handling. In addition, the producer must be vitally concerned with minimizing the length of time to achieve maturity, a marketable product, from the time of seeding. To satisfy these needs, the maintenance of favorable soil moisture conditions for rapid, vigorous, and healthy growth of turfgrasses is of vital importance in the profitable production of sod.

Among the cultural practices that were adopted by the sod producer in emerging from the "pasture stage" was sprinkler irrigation. In some areas of the country sod must be irrigated throughout most of the growing season. In the more humid areas such as my area in the Northeast, sod producers must rely upon supplemental irrigation to provide assurance of adequate soil moisture during unpredictable soil moisture stress periods which invariably occur during the growing season.

The importance of water in the life processes of a turfgrass plant is partially revealed by the fact that from 60 to 75 or more gallons of water are required for the production of one pound of dry matter by the plant. Although turfgrasses can tolerate a high degree of soil moisture stress without suffering permanent damage, adequate supplies of soil moisture must be maintained by supplemental irrigation not only to satisfy the demands for a high quality sod but also from the standpoint of economics of production to reduce or minimize the time required for maturity. Reducing the time to produce a marketable product constitutes an important factor in production costs since, as previously mentioned, sod generally is produced on land of high real estate value.

Since turfgrass plants can withstand a certain degree of drought stress, it is not essential to maintain every square foot of sod on a farm in an attractive green condition. Once the sod has reached maturity, emphasis upon watering can be relaxed and the sod allowed to become semi-dormant or even dormant. However, prior to marketing, it must be brought back to an attractive green condition. This can be readily accomplished with the resumption of proper water management to eliminate any soil moisture stress. In addition, a light application of a soluble nitrogen fertilizer will hasten growth as well as restoration of green color.

Other than encouraging maturity and providing for an attractive appearance, sprinkler irrigation may be effectively utilized for various purposes in the economic production and utilization of sod. The following are listed as prime examples:

1. Germination of new seedings: Practices in seeding differ throughout the country. Some areas will restrict seeding to the favorable season — the late summer-early fall season. Other areas will seed continuously throughout the growing season. This practice must rely upon sprinkler irrigation, usually by means of solid set.

2. Watering-in of materials: Fertilizer and possibly other chemicals can be watered-in after application to reduce the possibility of injury and/or accelerate activity of the treatment.

3. Fertilizer carrier: Soluble fertilizer can be applied by injection into the sprinkling system. An even distribution pattern becomes very critical.

4. Harvesting operations: Favorable soil moisture conditions are necessary to facilitate mechanical lifting of sod as well as provide moisture for its preservation until it is transplanted and watering resumed at the new site.

5. Post-transplanting management: Watering immediately after and also as a part of the transplanting procedure is very critical until the sod develops new roots and knits to the soil in which it is transplanted.

6. Waste disposal site: Sod farms may serve as a site for solid and liquid waste disposal.

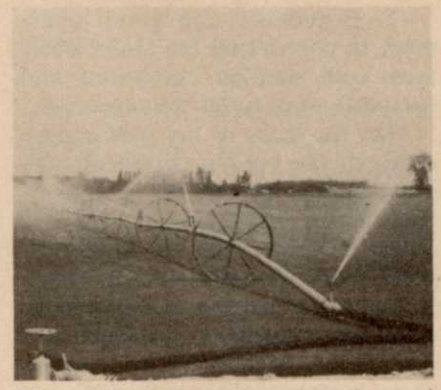
Important considerations in the establishment of a water management program on a sod farm are the basic questions of water quality, supply, amount, rate, frequency and time of application. It is beyond the scope of this article to expound upon these basic considerations for an effective and efficient sprinkler irrigation program. However, I wish to state that it is very difficult or impossible to establish rigid or arbitrary standards as answers to these questions because of the wide variations in many factors influencing water requirement for satisfactory turfgrass growth. Such factors as the turfgrass plant, stage of maturity of the sod, absorptive and storage capacity of the soil and climatic factors affecting the consumption and loss of water need to be considered. Accordingly, specific recommendations that would encompass all of these considerations and be inclusive of the extremely wide variation in conditions become an impossibility. An intelligent management program in the production of sod depends upon:

1. An understanding and appreciation of the functions of water in the establishment and growth of turfgrasses.

2. An understanding of the water requirements of turfgrasses.

3. An intimate knowledge of soil conditions present on the farm and their effect upon infiltration, storage and release of water for growth of turfgrasses.

4. A keen observation of turfgrass conditions and status of soil moisture from day to day.

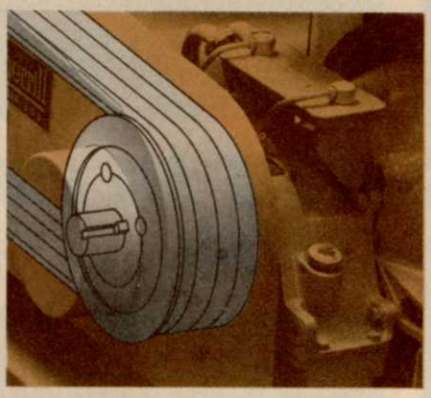


This wheel move system is a form of irrigation commonly used in sod production.

Mitts & Merrill Brush Chippers For... better design... more efficiency

For more than 115 years Mitts & Merrill has been making specialized machinery for industry. A major part of our business is equipment to reduce scrap and waste. This experience is incorporated into design features on our brush chippers that result in higher efficiency and longer, trouble-free service for you. Only Mitts & Merrill brush chippers offer features like these:

Staggered knife pattern for smoother cutting action. Mounted on an all-steel cylinder that, even without an external flywheel, is heaviest in the industry. Each cylinder revolution gives more cuts, produces smaller chips of uniform size. Self-adjusting knives are reversible; give twice the service between sharpening.



Optional torque converter isolates engine and transmission from cutting shock to minimize maintenance. Makes operation virtually fully automatic; increases operator productive time. Available on all models.

• **Positive safety-lock pin** for greater operator safety • **Swing-away, folding feed chute** protects cutting chamber; allows instant access and increases maneuverability • **Heavy duty construction** includes coil spring, torsion-type suspension, and box tubular steel frame.

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5. Experience and good judgement in correlating the above basic facts with weather conditions and forecasts—i.e. water management.

On the basis of my past experiences in the various facets of turfgrass culture in general, it appears that water management on sod farms is better than in other turfgrass areas. Perhaps a major reason is due to the fact that it becomes an economic necessity in profitable sod production. A common tendency on many turfgrass areas is to water excessively. This type of water management is not only wasteful and costly but can be detrimental to turfgrasses.

Irrigation of sod is very similar to that of other agricultural crops. However, one major exception is the necessity for uniform distribution patterns in the production of sod. Water distribution patterns become more noticeable and evident in the appearance, growth and quality of the sod than in the other agricultural crops. Accordingly, greater precautions must be taken in sod production not only in proper selection of sprinkler irrigation systems but also in the techniques of application.

The primary and most common method of sprinkler irrigation utilized on sod farms is by means of surface portable systems. Such systems include various means of movement of pipe ranging from manual to self-propelling by various different mechanisms.

Sod production lends itself very well to self-propelling mechanisms because of the levelness and size of the fields and the surface that sod provides to facilitate movement. Solid set systems are utilized to a limited extent — primarily for the germination of new seedings. However, I personally have noted solid set utilized throughout the entire production stages of the sod. Solid set greatly reduces but does not entirely eliminate the chore of moving pipe. In order to facilitate mowing, movement of pipe becomes necessary. Solid set would be most useful in low rainfall regions. Ideally, an economical underground pop-up system would be a sod producer's delight. However, systems of this nature which are presently available are prohibitive from the standpoint of economics.

A glance into the future of the sod industry on the basis of the energy crisis and economic forecasts makes one feel rather pessimistic. I personally have adopted an optimistic attitude. My outlook is based on such facts as:

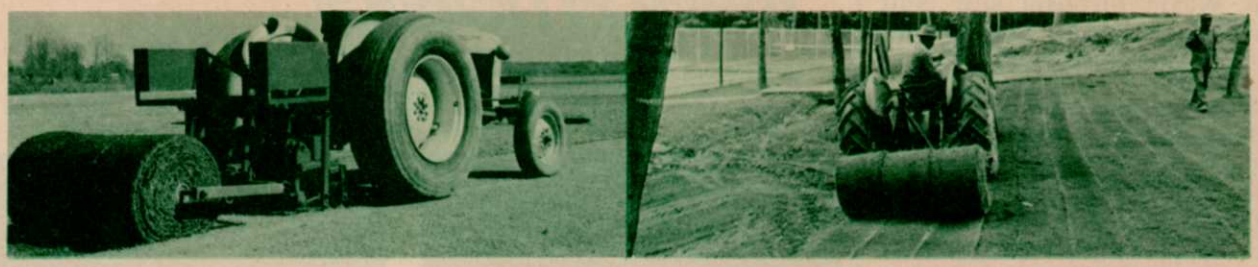
1. Sod represents a product that is vital to the enhancement of our environment for more enjoyable living. As long as we continue to be concerned about our environment and strive for its improvement, sod will occupy an important position.

2. Possible utilization of sod farms, protected by mandate against massive development, as a means of maintaining needed open space in an attractive condition.

3. Utilization of clippings as a source of nutritious feed for the production of animal products.

4. Solid and liquid waste disposal without detriment to the environment is one of our major concerns. Sod farms may effectively serve as a disposal site for solid and liquid waste in future management of our waste problems.

On the basis of these considerations, perhaps the future for sprinkler irrigation in sod production is brighter than what it may appear to be today in view of other problems.



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Harvest, load, and lay sod FAST, without manual lifting or handling. Let tractors do the hard work. Hand stacking and laying of sod is obsolete. Increases sales by cutting time and cost of installation. Stretches sod 3% to 5%, leaves lawns smoother, with fewer seams and joints. Disposable cardboard tubes are lighter and cheaper than pallets, permit easy loading, as many as 3 rolls at a time, with any fork lift, laying with any tractor.

No need to change over completely. Switch from Big Rolls to your present system in 5 minutes or less. This simple, rugged system can be had for as little as $100/month.

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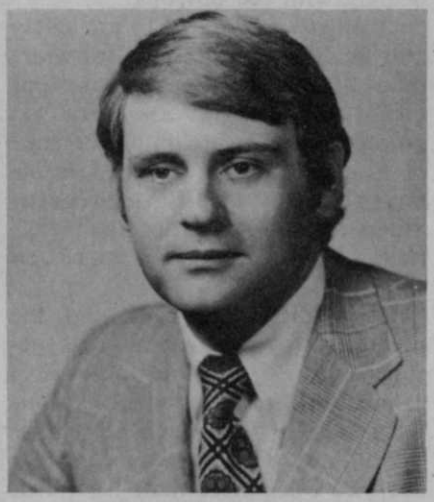
industry news and newsmakers

R. A. Bartlett Elected

Robert A. Bartlett, Jr., was elected president of the F. A. Bartlett Tree Expert Company at a board of directors meeting following the annual stockholders meeting. He had previously been executive vice president of the company. Former president, Robert A. Bartlett, who had resigned at the stockholders' meeting, became vice chairman of the board and chief executive officer of the company, according to the announcement by M. K. Bartlett, chairman.



Robert A. Bartlett, Jr.

Miami Removes Palms

Miami, Florida city crews began removing an estimated 3,000 palm trees suffering from lethal yellowing disease.

The city plans to replace the diseased palms and will also try to save others by injecting them with terramycin, a human antibiotic. The estimated cost of removal, replacement and the injections is about $50,000, city officials say.

Cushman/Ryan Meet

More than 50 dealer representatives are expected to attend the North American Cushman and Ryan turf care product sales meeting at the Marriott Inn, Clarksville, Ind. Vern Worrel, Cushman and Ryan product manager, said the dealers will attend the sales meeting Aug. 13-14. Clarksville is located across the Ohio River from Louisville, Ky.

Joe Owens (left) and Labe Jackson, owners of Jobe's Tree Food Spikes and officers of International Spike, Inc., Lexington, Ky., point with pride to their 1975 merchandising program. Sales for 1974 have exceeded forecast. Jobe's have announced they'll be at the International Shade Tree Conference and the 1975 Golf Course Superintendents conference.

Standardized Symbols Proposed for Pesticides

The introduction and use of visual symbols for human and environmental caution should be made mandatory for the labeling of pesticides, industry representatives and regulatory authorities were told at the First National Symposium on Pesticide Labeling.

Alvin H. Schechter, president of Schechter & Luth, Inc., said: "The incorporation of visual symbols as part of the cautionary labeling for pesticides would improve the communication of their hazards and risks to the consumer, as desired by the regulators, while leaving the manufacturer with most of his marketing options intact."

"Recognizing the great concern expressed in all quarters regarding the cautions that must appear on pesticide labels, these caution statements should be completely prescribed so that there is no latitude whatsoever for diluting the warning and thus giving the appearance that one product is less dangerous — or safer — than another. A set of standards can be devised for pesticide label cautions similar to the cautionary statement that must appear on each pack of cigarettes. By reducing the options for the cautionary statement, the possibility of making one product appear safer than another is eliminated; at the same time these statements will gain in clarity. The addition of new symbols for human and environmental caution would help standardize the location, size, sequence and language of the cautionary statements," Schechter stated.

While proposing a standardized format for the cautionary statements, the New York communications design consultant urged the Environmental Protection Agency to show sensitivity to the needs of the manufacturer, for whom the label and the package have important marketing functions. "It is imperative that the integrity of the creative areas of the package be maintained when the caution message is standardized," he noted. "Such elements as the trademark, trade dress, colors, and type should be free of regulatory constraints, subject only to marketing needs and objectives."

The adoption of visual symbols

Rotary mowers.

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Proven by thousands of hours in tough, sustained operations. Compare for design, strength, performance . . . with *any* make you've *ever* used. You'll *see* the difference. Nine outstanding models — in 5, 6, 7, and 15-foot cutting widths — for tractors rated 20 horsepower and above. Pull and lift types. Interchangeable parts; nationwide parts service. Six-month factory warranty. See your local Servis dealer . . . or let *us* know your needs. Full product line brochure sent *free* upon request.

There's a SERVIS rotary mower for every need.

Model	Width/Class	Type	General Mowing	Brush Cutting
Flex 15*	15′ Heavy Duty	Pull Only	Yes	Yes
Gyro 84	7′ Heavy Duty	Pull/Lift	Yes	Yes
Saturn 7	7′ General Duty	Pull/Lift	Yes	No
Gyro 72	6′ Heavy Duty	Pull/Lift	Yes	Yes
Cyclone 72	6′ Heavy Duty	Pull/Lift	Yes	Yes
Saturn 6	6′ General Duty	Pull/Lift	Yes	No
Gyro 60	5′ Heavy Duty	Pull/Lift	Yes	Yes
Cyclone 60	5′ Heavy Duty	Pull/Lift	Yes	Yes
Saturn 5	5′ General Duty	Lift Only	Yes	No

*Flexible contour cutter.

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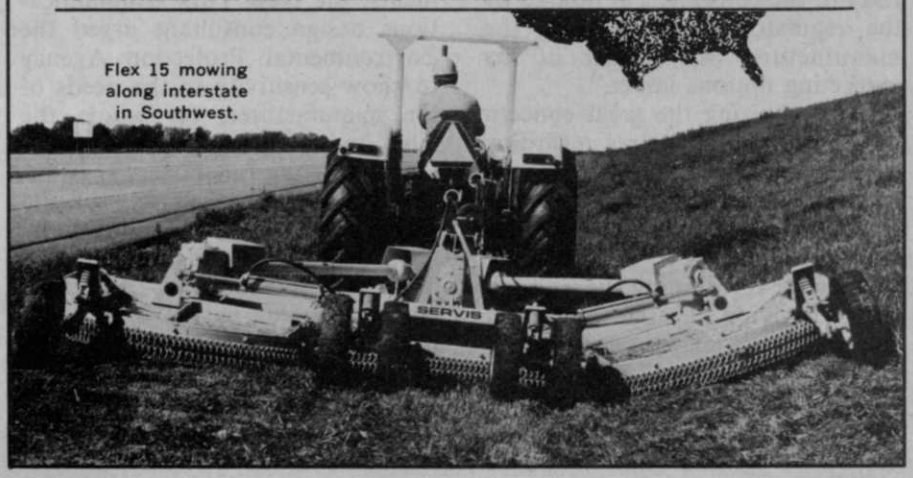

Flex 15 mowing along interstate in Southwest.

and their use in conjunction with a standardized cautionary message would go far, Schechter concluded, in meeting the legitimate concerns of consumers and regulators for minimizing risk in pesticide use while enabling the manufacturer to protect his position in the marketplace.

OSHA Labor Violations Involve few Standards

Only five per cent of the standards issued under the federal job safety and health law account for 80 per cent of the citations issued, claims OSHA boss, John H. Stender, noting that the standards are "all basic, common sense rules dealing with the obvious.'"

"What's more, just 15 job safety and health rules account for more than 40 per cent of all serious violations," said Stender. He pointed out that preliminary results of a study now in progress refute charges that OSHA enforces "thousands of esoteric standards" that bewilder and confuse employers.

In addition, Stender said the preliminary results show that despite a nearly threefold increase in inspections resulting in citations from July 1972 through December 1973, the rate of contested cases has dropped from more than 7 per cent to about 5 percent.

"That tells me," 'Stender said, "that employers are having less trouble with our citations — that they understand them and believe they are reasonable. It also tells me that the great majority of job hazards found during inspections are being quickly corrected."

The study, undertaken at Stender's request by a special OSHA task force, shows that more than 99 percent of all workplace hazards discovered by OSHA inspectors are corrected by employers.

Stender disclosed the preliminary results of the study in an address before the Governor's Annual Safety Award Conference and Exposition in Minneapolis.

Calling the OSHA record during its first three years "successful," Stender said the early results of the new study show that OSHA inspectors are "doing their job, employers are impressed with the fairness of OSHA inspections, and more importantly, hundreds of

thousands of workplace hazards have been, and are being, corrected."

The latest available figures show that since its inception in April 1971, OSHA made 138,781 inspections resulting in 91,293 citations alleging 468,702 violations, with proposed penalties totaling $11.8 million.

Stender identified among the standards most often cited those relating to machine guarding, safe walking and working surfaces, fire exits, proper electrical grounding and guarded floor openings.

He said further that of the 5 percent of the citations contested, 86 percent are "won" by OSHA. For purposes of the study, Stender said, a "win was any case that culminated in the employer's correcting a violation alleged by an OSHA inspector.

"And that's what OSHA is here for," he declared.

A breakdown of the 5 percent of citations that are contested shows:

— that 60 percent or three out of five, are settled before ever going to the independent Occupational Safety and Health Review Commission or the courts, resulting in abatement by employers of the hazards alleged as the basis of violations.

— that of the 40 percent that reach the Review Commission, the employer is ordered to correct the violation in two out of three cases.

"That net effect is that almost all hazards discovered by OSHA inspectors are corrected," Stender emphasized, adding that "in the few instances where OSHA cannot require correction of hazards we have strong reason to believe that conscientious employers do take steps to at least improve the conditions causing the hazard."

Reclaiming Course Offered

A new program designed to train technicians in land rehabilitation practices is being initiated by Colorado Mountain College beginning September, 1974. The program, intended to upgrade or totally train, gives its graduates two years of classes and practical field experience.

For additional information, contact: Land Rehabilitation Program, Colorado Mountain College, Leadville, Colo. 80461.

On-the-spot Citations To be Issued by OSHA

Occupational Safety and Health Administration (OSHA) compliance officers will begin issuing on-the-spot citations under certain circumstances.

John H. Stender, who heads OSHA, said he has issued instructions that are "clear and specific enough to preclude possible abuse of authority."

He said his program directive to field personnel is intended to "expedite citations for many inspections, assuring that protection is offered to employees in the shortest possible time."

Inspectors must confer with their area director before issuing citations, Stender said, and under no circumstances is any inspector authorized to propose on-the-spot penalties. These will be proposed later by the area director.

Previously, all citations have been prepared by the OSHA area director away from the workplace. Stender said the new procedure will "streamline" inspection activities, although there will be certain cir-

Take the guesswork out of turf insect control

Diagnostic Aid from TUCO

Many turf insect larvae are night feeders, so the first evidence of their activity frequently is damaged turf. Diagnostic Aid, applied to turf as directed, causes insects to emerge to the surface within 10 minutes. They can be identified and counted to determine the level of infestation and whether an insecticide should be applied. It also can be used after insecticide application to measure the control obtained.

Proxol* 80 SP Insecticide from TUCO

Proxol is the one insecticide developed especially for use on fine turf and ornamentals. Sod webworms and cutworms are two major groups of turf insects controlled by Proxol. It is estimated that each sod webworm larva can chew up 20 square inches of turf in its average life span of 20 to 40 days; the cutworm larva can devour up to 36 square inches. With 300 to 500 larvae generated from each adult in a period of 10 to 21 days, it becomes apparent why early detection and control are desirable. Using Diagnostic Aid and Proxol together lets you program insect control.

*Trademark

One bottle of Diagnostic Aid FREE in each case of Proxol 80 SP.

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TUCO Division of The Upjohn Company, Kalamazoo, Michigan 49001

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cumstances where on-the-spot citations may not be issued. These include:

— where a laboratory analysis is needed to determine whether there has been a violation.

— where the advice of others, such as construction or industrial hygiene specialists, is needed prior to determining if a violation exists.

— where the advice of legal staff is needed.

— where there are questions of OSHA's jurisdiction to enforce compliance.

— where reference to documents not available at the inspected establishment is needed to prepare the citation.

Hammen Named Associate Grower

Hammen Brothers Sod Co., Pickett, Wisc., was appointed franchised associate grower of Warren's Sod A-20 and A-34 Kentucky Bluegrasses. Hammen is located in the Appleton-Oshkosh area and will service the state of Wisconsin.

Presently, Warren's have nurseries and associate growers in 14 states and England.

Ramsey Seed Forms New Marketer

Ramsey Seed, Inc., Manteca, Calif., announced the formation of Prillcote Industries, Inc. to market its expanded line of treated seeds in U.S. and Mexico.

In addition to assuming responsibility for Ramsey's Cal-Kote process, the new company obtained exclusive U.S. and Mexican licensed rights to the Prillcote process developed by Coated Seed Ltd., Christchurch, New Zealand.

The licensing arrangement and the formation of Prillcote hopefully brings further technical improvement into seed coating.

The objective of the process is to provide each seed with a select strain of rhizobia to properly and effectively inoculate the germinating seedling. The seed is coated to increase the life span of the rhizobia until germination takes place. The coating helps protect the seed from damage by sunlight and other elements. It also provides nutrients for the germinating seed.

W. H. Ramsey (left), president of Ramsey Seed, Inc., and James Ramsey newly appointed president of Prillcote Industries.

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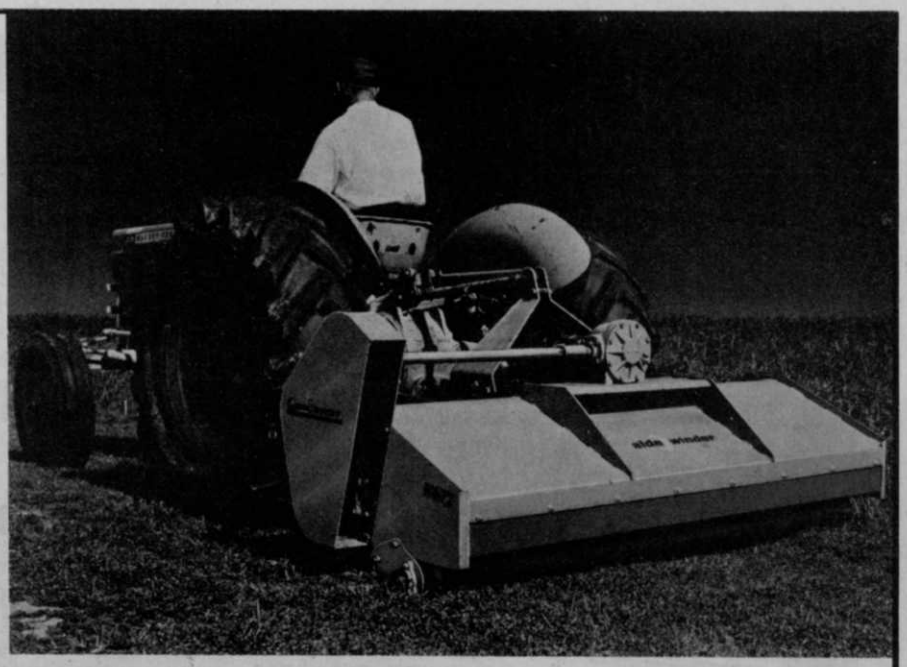
FM-72

The improved safety of flail mowing (compared to rotary cutting) plus a carpet-smooth finish in 6-foot wide swath. The new Side-Winder FM-72, designed for safer industrial, commercial and institutional mowing. Heavy steel shield and extra strong rubberized safety curtain give protection for operator and bystanders. New patented blade design thatches grass and weeds for smooth, well-groomed finish. Residue is pulverized for cleaner appearance and faster decomposition. Dyna-balanced blade drum protects bearings and gives a much smoother, quieter, vibrationless operation. Compare the FM-72 with any large capacity mower for a safe design and top performance.



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Pickseed West Expands

Pickseed West, Inc., world-wide producer and marketer of Certified Nugget Kentucky Bluegrass, plans to double the storage area at their Tangent, Oregon facility. The new addition should assist in servicing their customers more quickly and efficiently.

The company specializes in all Pacific Northwest grasses for turf and forage. It exports seed to users around the world as well as producing certified seed of foreign varieties for re-export.

Pickseed is affiliated with Otto Pick and Sons Seeds, Ltd., Richmond Hill, Ontario.

Pickseed West, Inc., plans to double this storage facility at Tangent, Ore.

New Book Stresses Labor

A new publication, Allocating Resources for Golf Course Maintenance — An Economic Analysis, by John Van Dam and William W. Wood, Jr., University of California, is now available at $1.00 per copy.

The booklet illustrates a method of analyzing the management of a golf course, particularly with respect to labor requirements. Budgeting, task specification and labor flow charts are the principal tools utilized.

Single copies are available from the Public Service Office, 90 University Hall, University of California, Berkeley, Calif. 94720. Organizations wishing to purchase in volume should send checks and orders to William Schneeflock, Cooperative Extension, 1422 South 10th St., Richmond, Calif. 94804. A 20 percent discount is applicable to orders of more than 10 copies.

Myers Begins Construction

F. E. Myers & Bro. Co., manufacturer of pumps, water systems, water conditioners and agricultural and golf sprayers, is constructing a new modern, all electric foundry designed to handle castings for brass, iron and malleable production.

Myers president, E. M. Myers, announced that the $5 million facility is scheduled for completion in late summer, 1975. He said the new plant will have a daily capacity of more than 60 tons of cast iron with the possibility of supplying other corporate needs.

Now, Exhalt800 Prolongs Pesticide Effectiveness; Exhalt4-10 Stops Excessive Moisture Loss.

You need both new Exhalt products to keep your turf and plants in top condition all year long.

Exhalt 800 Sticker-Extender. Even if it rains in an hour, you still get full extender activity, full pesticide effectiveness. Encapsulates and holds pesticides on turf or plant foliage; stops wash-off and weather erosion. Even flexes with leaf growth for longer action! And it reduces pesticide build-up in the soil.

Exhalt 4-10 Anti-Transpirant. Extends transplanting season, even during active growing weather. Minimizes effects of summer droughts, high temperatures and drying winds. Keeps grass in better condition! You don't have to agitate it during use, so you save time.

Both are simple to use. Both formulated for economical dilution ratios. Both mix with water—and you need only water to clean equipment. With Exhalt, messy clean-ups become a thing of the past.

Find out more. Write for our literature. Distributor inquiries welcome.

Exhalt™

800 Sticker-Extender 4-10 Anti-Transpirant for plants and turf

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Crop Protection Division
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'Creative' Cure for Chlorosis

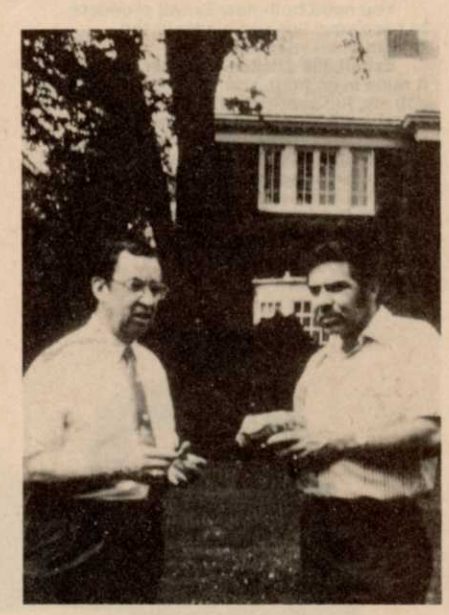
By WARREN WOLFE

You've got a tree with a chlorosis problem. You've tried ferrous sulfate sprays with erratic results, and you don't like what it does to leaves. You've tried foliar solutions with little success, and you haven't been satisfied with soil treatments.

Iron Medicaps could be the answer to your problem. This new approach lets you feed the iron compound directly into the sap stream of the tree. There's nothing to spray in the air, no chemicals to handle, no holes to drill in the ground. It takes just 10 minutes or less to treat a tree and you can expect results in only 2-4 weeks. More important, one treatment lasts up to three years.

The secret is fast-acting ferric ammonium citrate loaded into unique plastic capsules with slotted sides for slow, timed release. Marketed under the name "MEDICAP," these plastic capsules have been tested at leading experiment stations as well as by hundreds of commercial arborists and nurserymen.

Without exception, Medicaps have solved chlorosis problems. Researchers have found them easy to use and have reported no drawbacks to their use. Moreover, they report the unique bevelled head of the Medicap seals holes effectively and prevents sap from bleeding. Most implantation holes are closed by callus within a year.



John Duling (left) of Duling Tree Experts, Muncie, Ind., discusses Medicaps with author Warren Wolfe, president of Creative Sales, Inc., Fremont, Neb. Duling and other professional arborists use encapsulated soluble chemicals as part of their total tree-care program.

Medicaps are available in different sizes, Mini (⅜ inch), Standard (½ inch), and Super (11/16 inch) for use with trees of varying diameters. The capsules should be inserted into the tree from 2-4 inches apart and at different heights (from 1 to 3 feet above the soil) around the trunk. The ideal pattern would be to follow a spiral line from the 1 foot height up and around the circumference of the tree to a point 3 feet high directly above the starting point.

The hose size and depth must be enough to get the capsule entirely into the wood of the tree. When entirely inserted, the head of the capsule should be recessed slightly under the wood (not the bark). Then, the capsule will seal properly and avoid sap leakage.

Dan Neely, plant pathologist for the Illinois Natural History Survey, has been experimenting with iron capsules to control pin oak chlorosis for several years. In an article in the **Journal of Forestry,** Volume 71, Number 6, June, 1973 he reports on the successful use of Medicaps to treat chlorotic pin oaks in commercial nurseries and in several Illinois cities.

In summation of his work, Neely submitted data which shows the color of the tree before treatment and a comparison between MEDICAP treated and untreated (check) trees.

In the April, 1974 issue of **Arborist News,** Neely and D. F. Schoeneweiss reported on the use of iron capsules as well as other methods of controlling chlorosis. They report that "both implantation of dry salts and the soil injection of solutions have corrected iron chlorosis." But, they conclude "Implantation (Medicaps) requires less time and equipment than does soil injection, and is less troublesome."

Dan Neely treated these trees at Mayview Nursery with Medicaps in June '71. This photo was taken 30 days following treatment of trees 1, 3 and 4 (from left).

A close-up of trees 1 and 2 about 14 months after application shows second year effect of treated tree (left) and further decline of the untreated.

This Hinsdale, Ill. tree was treated in late July '72.

A Bald Cypress shows signs of iron chlorosis at time of treatment in June '71.

The same tree, 30 days after treatment, exhibits signs of total recovery.

The same tree in Hinsdale three weeks after treatment.

Medicap 'implants' remain in the tree. No return service call is needed to remove the applicators.

Injection sites normally heal over by tree callous a few months after application.

They recommend using Medicaps on pin oak in April, May or June according to table 1.

Neely and Schoeneweiss were not impressed with the use of foliar sprays and discounted the effect of soil treatments with sulfur and/or aluminum sulfate. Schoeneweiss did obtain good results with liquid iron chelates, soil injected at high rates. However the cost of material and the cost of application are considerably higher than the cost of treating with Medicaps. By conservative estimate, treating a 12 inch DBH tree with soil applied chelate would cost $20.00 per tree for material alone. Then you have the cost of drilling 160 holes to a depth of 12-15 inches, plus the equipment to inject 200 gallons of solution at a minimum of 150 psi pressure.

By contrast, treating a 12 inch DBH tree with Medicaps, would cost a homeowner only $8.95 for 10 capsules, plus the time to drill 10 injection holes and press in the cartridge. For a commercial arborist, the cost would be far less.

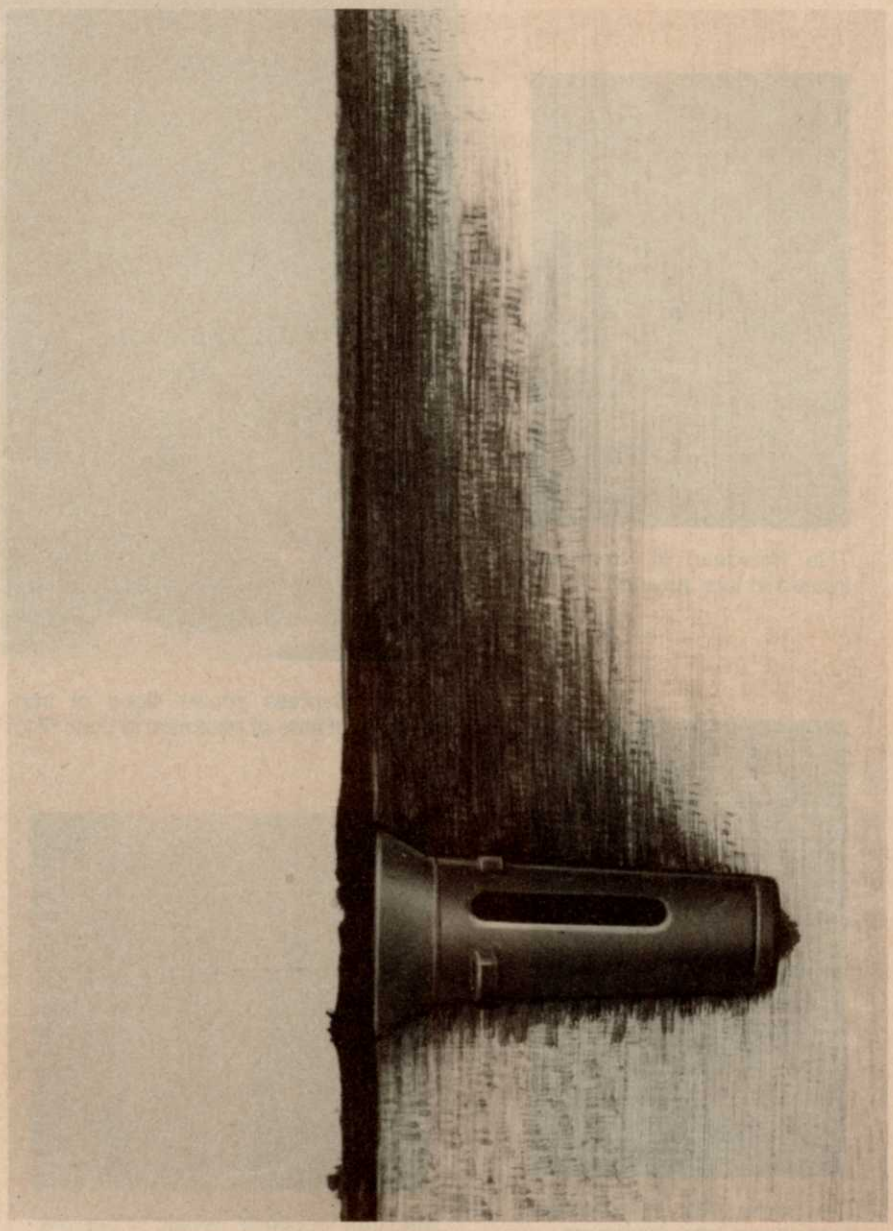
Elton M. Smith, Extension Specialist for Landscape Horticulture at Ohio State University, reports on Medicaps in his article "Chlorosis of Pin Oak-Encapsulated Iron Most Effective Remedy."

He used iron capsules in comparison studies with foliar spray and soil application of iron chelate, and trunk injections of iron sulfate. In summing up he reports, "Trunk implantations with capsules (Medicaps) were superior to all three compared treatments on visual observation, were longer lasting and quicker to apply."

Similar reports have been received from research scientists, city foresters, and independent operators over a widespread area. Medicaps are curing iron chlorosis. According to research evaluations by numerous universities, the capsule injection technique is equally adaptable to systemic pesticides. Recent popularity in tree trunk injection stems from the fact it avoids common public resistance to spraying. Furthermore far less time and equipment is required when compared to foliar sprays or soil injection.

Table 1

TRUNK DIAMETER (breast height)	MEDICAP SIZE	DISTANCE BETWEEN HOLES
1-4	Mini (⅜")	2
4-12	Std. (½")	3
12 and up	Super (11/16")	4



Medicap tree injection cartridges provide easy, economical placement of encapsulated soluble chemical directly into the active sap flow of the tree.

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organic nitrogen

The slow-release nitrogen for W.I.N.ning turf . . . because it has a high percentage of W.I.N. (water insoluble nitrogen). No danger of burning, either.

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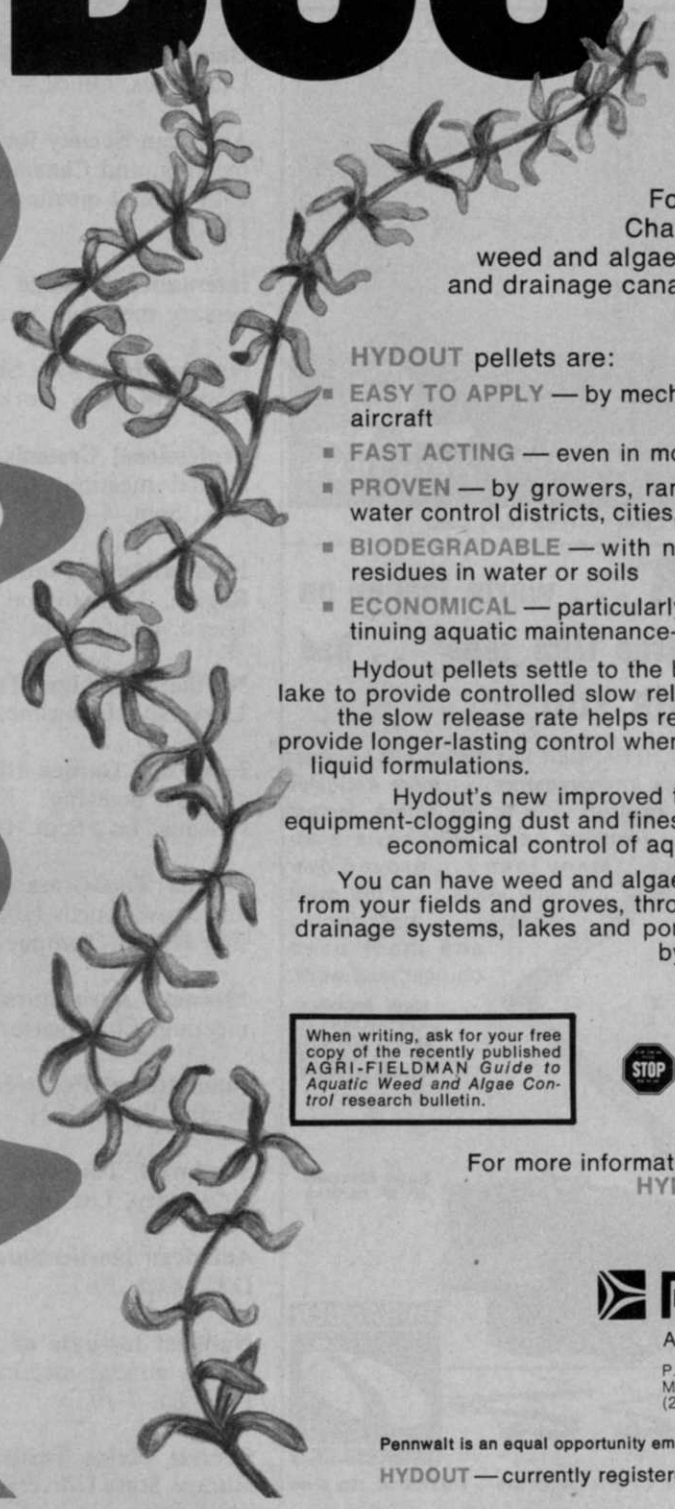

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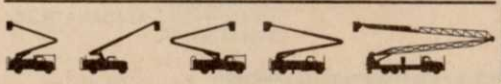

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meeting dates

Hyacinth Control Society, Inc., Langford Hotel, Winter Park, Fla., July 14-17.

American Sod Producers Association, summer meeting, Sheraton Inn-Northeast, Washington, D.C., (New Carrollton, Md.) July 16-19.

Turfgrass Research and Equipment Field Day, University of Maryland Plant Research Farm, Fairland, Md., Aug. 8.

Ohio Turfgrass Field Day, Ohio State University, Columbus, Ohio, Aug. 8.

American Society for Horticulture Science, 71st annual meeting, and **Canadian Society for Horticulture Science,** 19th annual meeting, University of Guelph, Ont., Aug. 11-17.

International Shade Tree Conference, Golden Anniversary meeting, Atlanta, Ga., Aug. 18-23.

National Hardware Show, 29th annual show, New York Coliseum, New York, N.Y., Aug. 25-29.

Professional Grounds Maintenance Society Conference, annual meeting, Crown Center Hotel, Kansas City, Mo., Sept. 4-6.

International Plant Propagators' Society, Western Region, 15th annual meeting, Mission Bay area, San Diego, Calif., Sept. 4-6.

Northern Michigan Turfgrass Field Day, Michigan State University Experimental area, Sept. 10.

Lawn and Garden Distributors Association Convention, annual meeting, Fairmon-Roosevelt Hotel, New Orleans, La., Sept. 11-12.

Florida Turf-Grass Association, combined conference and show, Curtis Hixson Convention Center and Riverside Hilton, Tampa, Fla., Sept. 16-19.

Midwest Agricultural Chemicals Association, annual meeting, Four Seasons, Lake Ozark, Mo., Sept. 17-19.

International Pesticide Applicators Association, Seattle. Wash., Sept. 18-21.

Southwest Turfgrass Conference, New Mexico State University, Las Cruces, N. Mex., Oct. 10-11.

American Horticultural Society Congress, Washington, D.C., Oct. 10-12.

National Institute of Parks and Grounds Maintenance, fourth annual meeting, Pittsburgh Hilton, Pittsburgh, Pa., Oct. 7-10.

Central Plains Turfgrass Conference, K-State Union, Kansas State University, Manhattan, Kans., Oct. 23-25.

For More Details Circle (124) on Reply Card

classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

Rates: All classifications 50¢ per word. Box number, $1. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

FOR SALE

DOUBLE EDGE sod cutter blades. Will fit any Ryan sod cutter. Works like double edge razor blade. Cuts much more sod per blade. Made to bolt on both ways. $24.00 plus postage. New automatic sod loaders for direct loading to pallets, trucks or trailers. No workers needed on ground. Both products developed and designed by Hadfield. Write or call Glen Hadfield, 4643 Sherwood, Oxford, Michigan 48051. Phone 313 628-2000.

SOD BLADES for Ryan, Brouwer, Beck. 12" to 18" heavy duty — $15.95, 24" — $17.95. Cut-off blades 12", 15", 16", 18" — $6.00, 20", 24", 26" — $8.00. All prices F.O.B. factory. Please write for complete literature. Money back guarantee. R & R Products, 3334 E. Milber, Tucson, Arizona 85714. Phone 602 889-3593.

ARPS stump cutter teeth, top quality and best price in U.S.A., D. J. Andrews, Inc., 17 Silver St., Rochester, New York 14611. Call 716 235-1230.

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Wholesale. Full line of quality grasses. Fescues, Ryegrasses and Bluegrass varieties including Fylking, Nugget and Glade.

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SOD QUALITY Merion Seed for discriminating growers. Fylking, Delta, Park, Newport, Nugget, Adelphi, Cheri, Glade and Baron bluegrasses as well as fine fescues. Also Manhattan fine leaved rye grass. We will custom mix to your specifications. Michigan State Seed Co., Div. of Vaughan-Jacklin Corp., Grand Ledge, Michigan 48837. Phone No. 517 627-2164.

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We want a man who can work independently and is knowledgable in the commercial turfgrass industry.

Must have experience and proven sales ability.

30 weeks air travel yearly, balance in office. All weekends at home.

Qualified man can start at $20,000 yearly. Travel expenses paid.

Send resume in confidence today. We will call you.

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GROUNDS SUPERINTENDENT needed with experience in horticulture, green house work, personnel supervision and landscape gardening — 150 acres of beautiful grounds to be maintained on the North Shore of Puerto Rico. Must be mature and have the ability to direct 50 people. Excellent salary and fringe benefits. Ability to speak Spanish desirable. Box 120, Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

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MISCELLANEOUS

TREE APPRAISALS, Surveys, loss evaluations and expert consultation services. For names of members of the American Society of Consulting Arborists, Inc., throughout the country, contact: Executive Director ASCA, 12 Lakeview Ave., Milltown, New Jersey 08850.

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1967 GMC 7500 single axle truck with John Deere 3415 Kotoboom, $8000.00. Phone 603 542-5030.

ISTC *(from page 16)*

"Business management," Prof. Charles H. Ingraham
Panel of the day's speakers

Session IV — Arboriculture Research and Education Academy
Panel discussion on research, extension and educational needs of arborists role, function and activities of the Academy (informal roundtable discussion)
Business discussion, John A. Weidhaas presiding

Evening:
Annual banquet and entertainment

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6 Models to Choose From: 42", 28", 20"

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The popular new 20" Sprig Harvester digs and loads 400 to 500 bu. of clean sprigs per hr. Up to 600-900 bu. with side loading elevator. Floating PTO Shaft and Shear-Pin protection. Heavy-duty construction.

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trimmings

Disposing of chemical containers is becoming a problem, say some experts. The National Agricultural Chemical Association suggests the rinse and drain method to help reduce the potential hazards of "empty" pesticide containers. First, the container should be allowed to drain in a vertical position for 30 seconds. Then, the container should be rinsed three times and allowed to drain 30 seconds after each rinse. The rinse should be drained into the sprayer that is being used for application. North Carolina State University specialists emphasize that used pesticide containers aren't safe for reuse for any purpose.

Who says you can't get something for nothing? A revised "Safety and Health Protection on the Job" poster is available free-of-charge from the Department of Labor. The poster, required by law to be posted in workplaces, is a more detailed version of the original one. It summarizes the provisions of the Act in easily understood language enabling both the employer and employee to understand their rights and responsibilities under the law. Posters may be obtained from OSHA regional offices in Atlanta, Boston, Chicago, Dallas, Denver, Kansas City, New York, Philadelphia, San Francisco and Seattle.

Achtung! Experiments conducted at Bavendorf, Germany have shown that certain systemic fungicides are toxic to earthworms. Earthworm activity was reduced significantly in the grass sod of apple orchards in which the trees had been sprayed with either benomyl, thiophanate or thiabendazole. Applications of dilute concentrations of these materials to soil in enclosed containers also produced a significant drop in earthworm activity. Of the three compounds, benoyml produced the greatest effect.

"If you can't plant a flower . . . pluck a weed." The City of Lubbock, Texas and Lubbock Chamber of Commerce have joined forces in a city-wide effort to rid alleys and vacant lots of weeds and rubbish. To be in violation of the weed ordinance, property must have a profusion of weeds that average 12 inches in height. If a violation exists, a notice will be mailed to the property owner who then will be given 10 days to cleanup.

Hitch hiking gypsy moths will be carried long distances by cars and recreational vehicles this summer. As the weather warms and more campers, fishermen and hikers seek recreational activity in the northeastern states, all stages of the gypsy moth — egg masses, larvae, pupae and adults can cling to vehicles parked in infested areas. Motorists are advised to perform periodical inspections of their vehicle to stop what may be the beginning of a new infestation.

A little more you-all. *Forest Research News* has changed its name. It is now *For The South* instead of *Mid-South*. The magazine is also being sent bi-monthly instead of quarterly.

The Committee of Nine, a top research advisory committee of the U.S.D.A. says the American consumer faces the possibility of certain food and fiber shortages within a few years unless state agricultural pesticide research and label clearance can be accelerated. The nine represent 55 state agricultural research stations in the U.S. The committee called for immediate computerization of pesticide tolerance data records and activities of interregional (IR) project IR-4, established in 1963. IR-4, under the direction of Dr. Charles C. Compton, Rutgers University, has developed a data collecting center and services as a clearing house nationally for the state agricultural experiment stations. This research data is used by IR-4 to obtain clearance from EPA for use of many pesticides not otherwise cleared by industry with EPA.

Equipment & Supplies Guide

WTT September Special

For More Details On Back Cover Circle (121) On Reply Card

Look at it this way
Before selecting an automatic irrigation system, consider the viewpoint of a blade of grass. It wants to see enough water coming its way often enough to keep it healthy. How much and how often depends on such variables as growing conditions, sun and shade, height, temperature, and course contour. That's why the happiest sight a blade of grass can see is a member of Rain Bird's exclusive Golf Team (six full time golf irrigation experts) consulting with a Rain Bird installer and the superintendent—right on the course. It means the best irrigation plan, tailored to your course, carried out with the most reliable equipment. Ask anyone with a Rain Bird system. Ask any blade of grass.
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Here's what Berkley Carter of Tuckahoe Turf Farms,* Slocum, R.I. has to say about

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U.S. Dwarf Variety Plant Patent No. 3186

"Of all the bluegrasses, Baron is resistant to more diseases. I've had two different bluegrass fields side by side and Baron always shows more resistance. It holds up its color throughout the season with a minimum of water and fertilizer."

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